

# Canadian Society of Plastic Surgeons/Société canadienne des chirurgiens plasticiens

## 72nd Annual Meeting/72<sup>e</sup> congrès annuel, June 21-23, 2018

Jasper, Alberta, Canada

**CSPS President/Président de la SCCP: Gorman Louie, MD, FRCSC**

**CSPS Vice-President & Scientific Program Chair/Vice-Président de la SCCP et président du comité du programme: Rob Harrop, MD, FRCSC**

**Annual Meeting Host Committee Chair/Présidente du comité d'accueil:**

**Lisa Korus, MD, FRCSC**

### 03EO - Eye-Opener Session

#### Rhinoplasty: Avoiding Pitfalls, Controlling Outcomes

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Rhinoplasty is one of the most challenging operations we, as plastic surgeons, perform. This presentation aims to explore the nature of the challenges inherent in this operation and in particular the sources of unpredictability in surgical outcomes. The latter includes the disruption of functional and aesthetic architecture due to reductive techniques, the destabilization of cartilage due to degloving, and the inherent weakening of anatomic structures due to their reduction and reconfiguration (eg, cephalic trim). Secondary cases will be used to illustrate these pitfalls. Principles (such as the 5R's of rhinoplasty) and techniques (such as grafting) will be presented with primary case illustrations as means to address these issues and improve the predictability of surgical outcomes.

#### Learning Objectives

- (1) To understand the structural principles of functional and aesthetic nasal anatomy.
- (2) To understand the factors and pitfalls that contribute to the unpredictability of surgical outcomes in rhinoplasty.
- (3) To understand the step-wise approach to rhinoplasty (The 5 R's).
- (4) To become familiar with surgical techniques available to improve the predictability of surgical outcomes in rhinoplasty.

#### Disclosure of Interest

Member of Simulare Medical Advisory Board.

### 01 - High-Risk Plastic Surgery: An Analysis of 108 303 Cases From the American College of Surgeons National Surgical Quality Improvement Program

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**Purpose:** There is a lack of large-scale data that examine complications in plastic surgery. A description of baseline rates and patient outcomes allows better understanding of ways to improve patient care and cost savings for health systems. Herein, we determine the most frequent complications in plastic surgery, identify the procedures with the highest complication rates, and examine predictive risk factors. **Methods:** A retrospective analysis of the 2012 to 2016 American College of Surgeons National Surgical Quality Improvement Program (NSQIP) plastic surgery data set was conducted. Complication rates were calculated for the entire cohort and each procedure therein. Microsurgical procedures were analyzed as a subgroup, where multivariate logistic regression models were used to determine risk factors for surgical site infection (SSI) and related reoperation. **Results:** We identified 108 303 patients undergoing a plastic surgery procedure, of which 6264 (5.78%) experienced any complication. The outcome with the highest incidence was related reoperation (3.31%), followed by the complication of SSI (3.11%). Microsurgical cases comprised 6148 (5.68%) of all cases, and 1211 (19.33%) experienced any complication. Similar to the larger cohort, the outcome with the highest incidence included related reoperation (12.83%) and SSI (5.66%). Increased operative time was a common independent risk factor predictive of a related reoperation or development of an SSI ( $P < .001$ ). A total of 23% of microsurgeries had an operative time at risk for increased

complications. **Conclusion:** The overall complication rate in plastic surgery remains relatively low but is significantly increased in microsurgery. The common risk factor for developing these outcomes includes increased operative time. Two team approaches and staged operations could be explored, as a large portion of microsurgeries are vulnerable to increased complications. **Learning Objectives:** (1) To explore the 30-day complication profile of adult plastic surgery. (2) To identify operations at higher risk of complications.

## 02 - Meta-Analyses in Plastic Surgery: Can We Trust Their Results?

C. McGuire<sup>1,\*</sup>, O. Samargandi<sup>1</sup>, J. Corkum<sup>1</sup>,  
H. Retrouvey<sup>1</sup>, and M. Bezuhly<sup>1</sup>

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**Purpose:** To assess the overall quality of meta-analyses in plastic surgery from 2007 to 2017, assess whether there has been an improvement in quality over time, and evaluate variables that may be associated with scientific quality. **Methods:** A systematic review of meta-analyses was undertaken using a computerized search of MEDLINE, EMBASE, and Cochrane Database for Systematic Reviews. Articles from 7 plastic surgery journals published between the years 2007 and 2017 were included. Publication descriptors and methodological and statistical methods were extracted. Each article was assessed using the A Measurement Tool to Assess Systematic Reviews (AMSTAR) instrument. **Results:** Sixty-seven studies were included. The number of meta-analyses increased between 2007 and 2017 with most coming from the United States. Most studies were outcome based, assessing a single intervention, from the journal *Plastic & Reconstructive Surgery*, and utilized a mean of 2465 patients (range: 44-14 884). Most meta-analyses analyzed primary studies in the middle tiers of evidence levels (II-IV), with a small percentage analyzing randomized controlled trials (16.4%). Random-effect modeling was most commonly used (47.8%) and meta-analyses generally had positive (82.1%) and significant results (74.6%). Meta-analyses evaluated clinical (80.6%), methodological (65.6%), and statistical heterogeneity (50.7%) variably in terms of appropriateness. AMSTAR scores ranged between 2 and 10, with a mean of 6.7 out of 11. AMSTAR scores were correlated with year of publication ( $P = .04$ ,  $R = 0.25$ ). Multivariable linear analysis indicated that more recent studies, studies that included a rationale for statistical pooling, and studies that properly managed methodological heterogeneity were correlated with higher AMSTAR scores ( $r = 0.66$ ,  $P < .01$ ). **Conclusion:** The quality and number of meta-analyses have increased; however, despite an improvement in quality, the overall quality of most meta-analyses remains low. Meta-analyses should utilize proper data pooling methods and account for clinical heterogeneity appropriately. **Learning Objectives:** (1) Understand the current state of meta-analyses in the plastic surgery literature. (2) Understand

the main reasons for lack of quality. (3) Learn how to properly evaluate meta-analyses.

## 03 - Advanced Pressure Visualization Technology: An Important Tool in the Race to Zero Pressure Injuries

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and K. Northrup<sup>1</sup>

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**Purpose:** Data from the AHRQ demonstrate that hospital-acquired pressure ulcers (HAPU) affect more than 2.5 million patients per year and cost \$11 billion per year. Current best practice is visual assessment and monitoring along with off-loading/turning every 2 hours. An advanced pressure visualization (APV) system with real-time pressure monitoring is evaluated on HAPU. A visual tool to assess and monitor pressure provides the opportunity to optimize repositioning and pressure reducing techniques. **Methods:** An APV was installed on all beds in the burn unit including a pressure sensor mat connected to a display tablet mounted on the bed. The tablet displays the patient's body image with continuous pressure readings utilizing a color gradient to exhibit pressure values: "red" >75 mm Hg, orange 60-74 mm Hg, yellow 45-59 mm Hg, green 30-44 mm Hg, light blue 15-29 mm Hg, and dark blue 1-14 mm Hg. Patients were asked to reposition themselves, or request repositioning assistance from the health-care team or family, when areas of high pressure colors were noted. **Results:** APV encouraged best practices for pressure injury prevention and engaged patients and families in effective pressure reduction. Incidence of HAPU in the burn unit has run 2.6 HAPU/month, and since the study has been instituted, there have been no HAPU. Data collected from 10 patients and 20 repositions showed initial peak pressures of 73.5 mm Hg. The reduction in peak pressure after self-repositioning was 41.25 mm Hg, resulting in average pressures of 32.25 mm Hg. **Conclusion:** APV empowers the provider to make patient decisions to ensure optimal outcomes with HAPU prevention. **Learning Objectives:** (1) Understand the importance of HAPU prevention. (2) Understand the current protocols/technology available for HAPU prevention. (3) Understand the APV system and how to incorporate it into a pressure ulcer prevention program.

### Disclosure of Interest

- Investor in Ideal Implant, HylaPharm and Strathspey.
- Mentor implant study at the Athena Trial.

## 03 - Canadian Expert Series

### Autologous Fat Grafting in Pediatric Plastic Surgery

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Autologous fat grafting is an established technique in plastic surgery whereby a mixed population of mature adipocytes, adipose-derived stem cells, endothelial cells, and others are harvested from areas of excess and used to correct contour deformities owing to congenital and traumatic causes. Increasingly, fat grafting is used in combination with other reconstructive techniques, including bone grafting, to improve outcomes in paediatric populations. Autologous fat grafting is limited by variable graft resorption and the need for repeat procedures. This lecture will provide an overview of advances in the basic cell biology of fat grafting and examine differences between paediatric and adult populations with regard to the efficacy of this technique. Examples of applications of autologous fat grafting in children and young adults will be provided with a discussion of potential pitfalls.

### Learning Objectives

- (1) Participants will acquire an understanding of the basic cell biology of autologous fat grafting and how it accounts for differences between paediatric and adult outcomes using the technique.
- (2) Participants will gain an appreciation for how autologous fat grafting can be used in combination with other established reconstructive techniques for the correction of congenital and traumatic defects in children.
- (3) Participants will gain an understanding of the limitations and pitfalls of autologous fat grafting in children and how these may be mitigated.

### 04 - Primary Murine Breast Cancer Growth and Metastasis Is Promoted by Adipose-Derived Stem Cells Alone, But Not Cell-Assisted Lipotransfer or Conventional Fat Grafting

J. Gencarelli<sup>1,\*</sup>, S. Gebremeskel<sup>1</sup>, A. Gareau<sup>1</sup>, A. Dugandzic<sup>1</sup>, B. Johnson<sup>1</sup>, and M. Bezuhly<sup>1</sup>

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**Background:** Cell-assisted lipotransfer (CAL) involves enrichment of autologous fat with supraphysiologic numbers of adipose-derived stem cells (ASCs) to improve graft take. ASCs have previously been shown to promote cancer progression, raising concerns over the safety of ASCs and CAL in postoncologic breast reconstruction. The authors compared the effect of ASCs alone, CAL, and conventional fat grafting on breast cancer growth and metastasis. **Methods:** Proliferation and migration of murine 4T1 breast cancer cells cultured in control medium or mouse ASC- or fat graft-conditioned media were assessed by flow cytometry and scratch assay, respectively. Transcription levels of arginase-1, TGF, and VEGF were assessed in ASCs and fat graft by quantitative reverse transcription polymerase chain reaction. An orthotopic mouse

tumor model was used to evaluate breast cancer progression and metastasis. 4T1 cells were injected into the mammary pad of female BALB/c mice. Six days later, tumor sites were injected with saline, ASCs, fat graft, or CAL (n = 7/group). Two weeks later, primary tumors were examined by immunohistochemistry and lung metastasis was quantified. **Results:** ASC-conditioned medium increased cancer cell proliferation, migration, and transcription of arginase-1, TGF, and VEGF compared to fat graft-conditioned or control media. Tumor site injection with ASCs alone led to increased primary tumor growth and lung metastasis compared to control, fat graft, or CAL groups. Additionally, ASC injection led to increased CD31+ vascular density in tumors. **Conclusion:** Adipose-derived stem cells alone, but not conventional fat graft or CAL, promote breast cancer cell proliferation and invasiveness in vitro and in vivo. **Learning Objectives:** (1) Participants will be able to describe the effect of supraphysiologic dosing of adipose-derived stem cells, as occurs in cell-assisted lipotransfer, on cancer progression in a murine model of breast cancer. (2) Participants will be able to identify the safety concern of this technique versus conventional fat grafting for oncologic breast reconstruction.

### 05 - Effect of Function-Blocking RHAMM Peptides on Fibrosis in a Bleomycin-Induced Scleroderma Mouse Model

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**Purpose:** Scleroderma is a chronic inflammatory autoimmune condition marked by dermal fibrosis. Function-blocking RHAMM (receptor for hyaluronan-mediated motility) peptides have shown promise in reducing fibrosis in other models. This study aims to quantify the effect of these injectable peptides on fibrosis in scleroderma. **Methods:** Forty-eight 6-week-old mice were randomized into 4 groups: 12 injected with 50 µL of 1 µg/µL bleomycin every second day to induce scleroderma; 12 injected with 50 µL of 0.9% saline as control, 12 injected with 50 µg bleomycin every second day and peptide 1 every fourth day; and 12 injected with 50 µg bleomycin every second day and peptide 2 every fourth day. Mice were killed on day 28. Skin biopsies were processed into 5 µm sections for immunohistochemical analysis (H&E, Masson trichrome, and picrosirius red) to quantify the extent of fibrosis. RT-PCR analysis was used to quantify collagen 1 and 3 gene expression. **Results:** Peptides 1 and 2 injections both resulted in a 7% decrease in dermal thickness ( $P < .01$ ) compared to the bleomycin group but did not affect subcutaneous adipose tissue thickness. Polarized microscopy of picrosirius red slides showed with peptide 1 injections resulted in a 10% decrease in the collagen fibril area as quantified by polarized microscopy of picrosirius red staining ( $P < .01$ ). Furthermore, peptide 1 injections resulted in a 44% decrease ( $P < .01$ ) in high-density collagen bundles and a

5-fold decrease in collagen 1 to collagen 3 gene expression levels ( $P < .01$ ). **Conclusion:** Injection of function-blocking RHAMM peptides led to decreased dermal thickness, collagen bundling, and decreased collagens 1 and 3 gene expression compared to bleomycin injections alone. The RHAMM pathway has not been previously studied in scleroderma and is a promising new avenue for developing targeted therapeutic options. **Learning Objectives:** (1) Describe the histological skin changes of scleroderma. (2) Understand the molecular mechanisms of hyaluronan signaling.

## 06 - Analysis of Dermal and Implant–Matrix Interfaces in Patients Showing Postoperative Inflammatory Changes After Breast Reconstruction

M. A. Danino<sup>1,\*</sup>, M. Iliescu Nelea<sup>1</sup>, A. El Khatib<sup>1</sup>, J. Efanov<sup>1</sup>, C. Bernier<sup>1</sup>, and L. Paek<sup>1</sup>

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**Overview and Goals:** Acellular dermal matrix (ADM) has become a mandatory tool in reconstructive breast surgery. Since its introduction, it has been considered to be a nonreactive and nonimmunogenic scaffold. However, some patients who undergo breast reconstruction with ADMs develop postoperative cutaneous erythema overlying their matrix. The aim of this study is to have a better understanding of this phenomenon, also known as “red breast syndrome.” **Methods:** A prospective analysis was conducted, including patients with implant-based breast reconstruction who developed cutaneous erythema overlying the area where ADM was located and who underwent a secondary surgery for various reasons. During the revision surgery, specimens from the periprosthetic capsule and from the implant at the ADM site were sampled. All samples were analyzed under a scanning electron microscope. Observations were charted in order to score and objectivize the following parameters: texture/cellularity/presence of biofilm and characterization of bacteria. These measurements were performed using Adobe Photoshop software. **Results:** Five patients with breast cancer were included, all of them with AlloDerm dermal matrix. All specimens were colonized by various bacteria from gram-negative bacilli to gram-positive microorganisms. Biofilms were always present, at various spreading width and thickness. **Conclusion:** The etiology of skin erythema overlying ADM grafts, and the so-called “red breast syndrome,” may be related to a contamination with various bacteria. Although contamination was omnipresent in analyzed samples, its importance can be subject to significant variability. Even if some ADM grafts have been retained, this could be at the price of a chronic local inflammation. **Learning Objectives:** (1) Infection prevention begins with an understanding of bacteriology and reduction of patients’ risk factors. (2) While by no means exhaustive, our research has provided a general summary of the significant challenges, with practical solutions.

## Disclosure of Interest

- Consultant and speaker for Allergan Inc; Establishment Labs.
- Received payment from Allergan Inc, Establishment Labs, Johnson + Johnson.
- Participating in or has participated in a clinical trial within the past 2 years for Allergan Inc, Establishment Labs, Annexa Inc.

## 07 - Bony Anatomy in Hand Central Synpolydactyly: Impact on Surgery

É. Bougie<sup>1</sup>, P. Egerszegi<sup>1,\*</sup>, P. Grenier-Vallée<sup>1</sup>, and A. Damphousse<sup>1</sup>

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**Purpose:** Hand central synpolydactyly (CSPD) is a complex congenital hand malformation requiring careful planning for reconstruction. Preoperative evaluation of radiographs is key in preparation for surgery including osteotomy, arthroplasty, and ligament reconstruction. There is little information available in the literature concerning bony and articular management of patients with this condition. **Methods:** All patients with hand CSPD, seen at Sainte-Justine Mother and Child University Hospital Center between 1988 and 2017, were evaluated including hand photographs and radiographs. All were classified using our bony anatomy classification system (BACS)—identifying the involved hand, the level of the beginning of duplication, synostoses between the duplicated elements (–) and with adjacent elements (+), and presence of symphalangism (\*). All operative reports were reviewed noting osteotomies, arthroplasties, and ligament reconstructions. The impact of BACS on the performed reconstructions was evaluated. **Results:** A total of 20 hands in 14 patients (7 females and 7 males) were reviewed. Seventeen hands were reconstructed, 1 was deemed nonoperable, and 2 are awaiting surgery. There was a predominance of synostoses between the elements of the duplication (–), 75% in contrast to those with an adjacent element (+) 33%. All synostoses (+/–) required osteotomies. Fifty-six percent of operated cases beginning at or involving periarticular bones required arthroplasty. Hundred percent of hands involving fusion with adjacent elements (+) or duplication at the joint required collateral ligament reconstruction. **Conclusion:** Our BACS is a useful classification system aiding planning and reconstruction of hand CSPD. Careful preoperative organization of surgery in these patients is essential to optimize surgical management and, ultimately, postoperative outcomes. **Learning Objectives:** At the end of this presentation, the attendee will be able to (1) recognize the complexity of the bony anatomy in CSPD, (2) use the BACS in classifying hands with CSPD, and (3) understand the importance of preoperative planning for bony, articular, and ligamentous reconstruction in CSPD.

## 08 - Revision Surgery Following Gracilis Transplantation for Pediatric Facial Reanimation

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**Purpose:** Gracilis muscle transplantation is the current gold standard for smile reconstruction in the paralyzed face. Despite the ubiquity of the technique, there are limited data regarding the rate of secondary surgery to address concerns and deficiencies. This study aims to characterize the incidence and type of secondary procedures following gracilis transplantation performed for pediatric facial reanimation at the Hospital for Sick Children. **Methods:** A retrospective cohort study was performed, identifying children who underwent secondary revision between 1985 and 2014 following gracilis muscle transplantation. Secondary procedures were performed after a minimum period of 1 year following the muscle transplant. Procedures related to immediate postoperative complications were excluded. **Results:** Over a 29-year period, 256 cases of facial reanimation utilizing a gracilis muscle transplant were performed. Fourteen patients who had their primary muscle transplant completed at SickKids required revision—an institutional rate of 5.5%. Ten children requiring revision had gracilis muscle transplants powered by cross-face nerve grafts, with the remaining 4 having transplants innervated by the motor nerve to masseter. Twelve (4.7%) patients underwent minor revisions intended to improve cosmesis and symmetry. Only 2 (0.8%) patients required major revisions, in which the gracilis transplanted in the primary surgery was completely removed and replaced with a new free functioning gracilis. **Conclusions:** Our experience supports the use of free functioning gracilis muscle transplantation as a reliable method for smile reconstruction in pediatric facial palsy, requiring low rates of secondary revision. Secondary surgery is most often performed to improve cosmesis and/or symmetry. Major revisions requiring microvascular transplantation of new muscle are rare. **Learning Objectives:** (1) Participants will understand the rate of revision following gracilis muscle transplantation for pediatric facial reanimation performed at a tertiary care hospital. (2) Participants will understand the types of revisions that may be required following gracilis muscle transplantation for pediatric facial reanimation.

## 09 - Vascular Anatomy in Hand Central Synpolydactyly: Impact on Surgery

P. Grenier-Vallée<sup>1</sup>, E. Bougie<sup>1</sup>, J. Dubois<sup>1</sup>, and P. Egerszegi<sup>1,\*</sup>

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**Purpose:** Hand central synpolydactyly (CSPD) is a complicated combination of syndactyly and polydactyly involving the index, middle, or ring finger. Its treatment is complex with a

risk of vascular compromise. Literature is lacking on the vascular patterns which could explain this morbidity. **Methods:** Between 1988 and 2017, all patients consulting for hand CSPD at Sainte-Justine Mother and Child University Hospital Center were investigated including hand photographs, radiographs, and angiograms. These were evaluated according to the Coleman and Anson superficial arterial arch classification system and our new digital artery classification system (DACS based on the number of syndactylized digits—A = none, B = 2, etc—the total number of arteries perfusing these at the mid-proximal phalanx level and the laterality). The impact of DACS on surgery and vascular compromise was evaluated. **Results:** There were 14 patients (7 females and 7 males) with 20 involved hands. Sixteen presented with complete (7 type A, 8 B, and 1 E) and 4 with incomplete superficial arches (2 A and 2 D). One hand had the expected number of arteries (C6). Nineteen hands were missing 2 or more arteries, including 1 hand with a single artery perfusing 3 digits precluding required surgery. Of the 17 hands operated, 2 required arterial transfer from the amputated digit to an adjacent one. There were no cases of vascular compromise. **Conclusion:** Preoperative angiography is crucial in planning hand CSPD surgery, since most involved hands are missing several digital arteries. Classification of the vascular anatomy and careful planning can prevent the complication of vascular compromise. **Learning Objectives:** At the end of this presentation, the attendee will be able to (1) recognize the complexity of the vascular anomalies present in hand CSPD, (2) use the DACS in classifying hands with CSPD, and (3) understand the importance of angiographic imaging for planning surgery in CSPD.

## 9CE - Canadian Expert Series

### Management of Mandibular Condyle Fractures

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**Learning Objective:** At the end of the lecture, the learner will be able to recognize the appropriate application of closed versus open treatment methods in the management of mandibular condyle fractures.

## 10CE - Canadian Expert Series

### ADM in Breast Reconstruction—Indications and Tips for Making It Work

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Acellular dermal matrix (ADM) products have been used with increasing frequency in post mastectomy breast reconstruction. Surgeons must balance the advantages associated with these internal support structures against increased costs, added

surgical time, and specific risks including infection, seroma, and inflammatory tissue responses. This presentation will review indications for the use of ADM in both direct-to-implant and planned 2-stage reconstruction and discuss strategies to minimize complications and reoperations.

## Learning Objectives

At the conclusion of this presentation, the learner will be able to

- (1) List the various ADM options available in Canada for breast reconstruction
- (2) Evaluate the advantages and disadvantages of the use of ADM in both direct-to-implant and planned 2-stage breast reconstruction
- (3) Develop a strategy to minimize complications as well as treat common complications associated with the use of ADM in breast reconstruction

## 10 - Population Trends in Immediate Breast Reconstruction Following Mastectomy and Administration of Adjuvant Radiotherapy

C. Doherty<sup>1,\*</sup>, S. Pearce<sup>1</sup>, N. Baxter<sup>1</sup>, A. McClure<sup>1</sup>, D. Ross<sup>1</sup>, and M. Brackstone<sup>1</sup>

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**Purpose:** In the last decade, there has been an initiative to offer patients undergoing mastectomy an opportunity for immediate breast reconstruction. One of the challenges with immediate implant-based reconstruction is the unknown potential for adjuvant radiation therapy. The purpose of this study is to investigate the changes in practice patterns for immediate breast reconstruction and whether there is an increased incidence of adjuvant radiotherapy as a result. **Method:** This retrospective population-based cohort study included all adult women who underwent a mastectomy in Ontario from January 1, 2007, to December 31, 2014. Multiple provincial databases were used for diagnostic and procedural data. Data sets were linked and analyzed at the Institute for Clinical Evaluative Sciences, Western University. Potential predictors of immediate reconstruction were assessed using unadjusted and adjusted modified Poisson regression analysis. This approach was also used to assess predictor variables and incidence of radiotherapy within a subgroup of patients with cancer. **Results:** Between January 1, 2007, and December 31, 2014, a total of 25 861 patients underwent mastectomy and 2972 (11.5%) had an immediate breast reconstruction. Adjusted immediate breast reconstruction increased each year from 7.15% in 2007 to 17.8% in 2014 ( $P < .0001$ ). The number of patients not pursuing immediate breast reconstruction remained constant. Multiple predictors of immediate breast reconstruction were identified. The proportion of patients administered adjuvant radiotherapy in the setting of immediate implant-based reconstruction significantly increased year-after-year (19.1%-29.5%),  $P = .004$ . This trend was not seen for flap-based reconstruction, which

remained constant (22.9%-21.9%),  $P = 0.54$ . **Conclusion:** The proportion of patients receiving immediate breast reconstruction following mastectomy is significantly increasing as is adjuvant radiotherapy in the setting of implant-based reconstruction.

**Learning Objectives:** (1) Understand the trends and predictors of immediate breast reconstruction at a population level. (2) Describe the incidence of adjuvant radiotherapy administration in the setting of immediate breast reconstruction.

## 11 - Minimizing the Use of ADM in Direct-to-Implant Breast Reconstruction Following Prophylactic Mastectomy: Introducing the Split Pec Technique

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**Purpose:** Potential indications for the use of acellular dermal matrix (ADM) in breast reconstruction continue to increase. However, the cost of ADM is high often prohibiting the general use in many Canadian hospitals. Here, we describe a technique using minimal ADM used in any immediate breast reconstruction up to a full C cup. **Methods:** Selected patients undergoing total skin-sparing and nipple-sparing mastectomy and immediate prosthetic reconstruction at the authors' institution (WCH) between 2016 and 2018 were identified. Once the mastectomy had been completed, a vertical split 10 cm in length in parallel to the muscle fibers was performed, and a submuscular pocket was created with serratus fascia raised laterally to allow total coverage of the implant. The inferior attachment of the muscle was left intact. Once a suitable pocket was fashioned, the implant was inserted. A 4 × 12 cm piece of ADM was used to cover the splayed anterior opening in the muscle and secured with suture. **Results:** To date, we have completed vertical split breast reconstructions on 30 patients (9 unilateral and 21 bilateral) with implant size ranging from 225 to 565 g (all smooth round). A 4 × 12 cm ADM was used with good results in shape, symmetry, size, and position. A medical chart review was performed and data regarding pain control, drainage, and animation dynamics were collected with comparable outcomes. **Conclusion:** This pec muscle split technique can be used in small to moderate (C cup)-sized breast reconstruction using minimal ADM, with good outcomes. Using minimal ADM will offer cost saving compared to the standard size of ADM used in other breast reconstructive techniques using ADM. **Learning Objectives:** (1) The audience will review current economic constraints related to modern techniques in breast reconstruction in Canada. (2) The audience will review a novel technique of direct-to-implant breast reconstruction.

## Disclosure of Interest

- Investor in QoC Health Inc.

## 12 - Direct-to-Implant Prepectoral Breast Reconstruction

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J. -F. Boileau<sup>1</sup>, and T. Dionisopoulos<sup>1</sup>

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**Purpose:** There has been a resurgence in popularity of prepectoral reconstruction with the advent of new technologies and materials such as acellular dermal matrix (ADM), forming stable silicone gel implants and intraoperative tissue perfusion analysis. Our center has been utilizing a direct-to-implant prepectoral (DTI PP) reconstruction technique for over 2 years. This article aims to revisit the notion of immediate DTI PP breast reconstruction and provide our Montreal Jewish General Hospital (JGH) single surgeon experience. A cost analysis is also presented and compared to traditional subpectoral 2-stage reconstruction. **Methods:** Clinic log books were used to identify all patients who underwent DTI PP breast reconstruction with ADM over an 18-month period. A full electronic medical record review was performed. All countable variables were included in the cost analysis. **Results:** A total of 77 patients representing 116 reconstructed breasts were included. The prepectoral group was composed of 39 patients and 60 breasts and the subpectoral group of 38 patients and 56 breasts. Patient demographics including age, diabetic and smoking status, and neoadjuvant chemo were similar for both groups. When compared to the traditional 2-stage subpectoral reconstruction, patients having undergone DTI PP reconstruction benefited from fewer complications (24.7% vs 35.6%, respectively), fewer follow-up visits (3.8 vs 5.4, respectively), and no animation deformity. The DTI PP reconstruction proved to be 25% less expensive than 2-stage subpectoral reconstruction when all associated costs were considered (\$17 243 vs \$22 716 CAD, respectively). **Conclusion:** Using proper patient selection, form stable implants, and ADMs, reconstruction breast surgeons are now able to provide safe and consistent results using the prepectoral technique. Additionally, prepectoral reconstruction appears to be cost-effective with a similar complication profile. **Learning Objectives:** Participants will learn about the advantages of the DTI PP breast reconstruction technique as compared to traditional 2-stage subpectoral reconstruction.

## 13 - Quantitative Orthopedic Spine Benefits Post Breast Reduction—A Prospective Study

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and L. Lessard<sup>1</sup>

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**Purpose:** Breast hypertrophy comes with an array of signs and symptoms that range from mild to debilitating in nature including headache, neck pain, back pain, breast pain, painful bra strap grooves, hand numbness, and shortness of breath. Breast reduction surgery has been shown to have the highest patient

satisfaction and improvement in quality of life on specific satisfaction surgery questionnaires. The effects of breast reduction surgery on parameters such as sagittal spinal balance, paraspinal muscle function, and physical performance have not been evaluated. The objective of this study is to evaluate the effects of reduction mammoplasty on sagittal spinal balance, paraspinal muscles, and physical function using sophisticated spine surgery imaging modality pre and post breast reduction. **Methods:** This is a prospective, observational cohort study being carried out at the McGill University Health Centre. Twenty-five patients are prospectively enrolled in this IRB-approved study. The following methods are used preoperatively and postoperatively for each patient: EOS X-ray (ultra-low-dose radiation) of the spine, MRI of the spine, clinical evaluation, and patient self-assessment outcomes including BREAST-Q (validated questionnaire in FR&ENG). **Results:** Postoperative improvement in thoracic kyphosis (6°) and lumbar lordosis (3°) are documented quantitatively on patients scanned in the standing position. Preoperative and postoperative MRI of the spine demonstrate quantitative changes in cross-sectional area and functional cross-sectional area. Significant postoperative improvement in all BREAST-Q categories documented. The measurements, as well as the radiographic evidence, will be presented. **Conclusion:** Reduction mammoplasty is not merely an aesthetic procedure but also a procedure with quantitative spine benefits. This may have an impact on health-care system and third-party payer insurance companies and may beckon the need for better guidelines based on those quantitative findings. **Learning Objectives:** Participants will be able to identify the objective benefits of reduction mammoplasty in the emotional and physical QOL of patients.

## 14 - Crowdsourcing as a Novel Method to Evaluate Aesthetic Outcomes of Treatment for Unilateral Cleft Lip

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and B. Comstock<sup>1</sup>

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**Purpose:** Our ability to study results and optimize treatment of unilateral cleft lip (UCL) is hampered by a lack of convenient and reliable methods to grade aesthetic outcomes. Crowdsourcing involves gathering contributions of many individuals to produce an ultimate result. We hypothesized that the cumulative assessments by a large number of lay assessors could be used to reliably grade aesthetic outcomes of UCL. **Methods:** We assembled a sample set of 50 de-identified photographs of 8- to 10-year-old participants (46 repaired UCL, 4 control) to be assessed by crowdsourcing. Multiple comparisons for each image (n = 50) were used to generate ELO scores to determine rank. On a separate survey, multiple Asher-McDade (A-M) ratings were obtained for each image (n = 38). Both surveys were repeated to assess reliability. A group of expert surgeons repeated the same tasks on a smaller subset of photographs for comparison. **Results:** We obtained 2500 and 1900 anonymous,

layperson evaluations via crowdsourcing on each ELO rank and A-M survey, respectively. ELO rank and A-M scores were highly reproducible (correlation coefficients of 0.87 and 0.98) and crowd evaluations agreed with those by expert surgeons (0.980 and 0.96 for ELO rank and A-M score). Crowdsourcing surveys were completed within 9 hours, whereas the expert surgeons required 3 months. On further analysis of our cleft participants sample set, we found that greater initial cleft severity was associated with worse aesthetic outcome. **Conclusion:** Outcomes assessed by crowds were reliable and correlated well with expert assessments. Crowdsourcing allows acquisition of massive numbers of layperson assessments on an unprecedented scale and is a convenient rapid and reliable means to assess aesthetic outcome of treatment for UCL. **Learning Objectives:** Participants will be able to describe the reliability of crowdsourcing for assessment of aesthetic outcomes.

## 15 - Reporting Outcomes and Outcome Measures in Digital Replantation: A Systematic Review

A. Thoma, S. Moltaji<sup>1,\*</sup>, J. Murphy<sup>1</sup>, L. Gallo<sup>1</sup>, M. Gallo<sup>1</sup>, and D. Waltho<sup>1</sup>

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**Purpose:** To identify all outcomes and outcome measures used in the digital replantation literature as a foundation for consolidating, a critical outcome set via the Delphi method. **Methods:** This study is registered on PROSPERO and adheres to PRISMA guidelines. Randomized controlled trials, cohort studies, and single-arm observational studies of adults undergoing replantation for amputation distal to the MCPJ, with at least 1 well-described outcome or outcome measure, were eligible. MEDLINE, EMBASE, Cochrane, CINAHL, and grey literature were searched. Primary outcomes of interest were outcomes and outcome measures utilized. Secondary outcomes were validity, reliability, and responsiveness of measures utilized. A priori outcome reporting, outcome definition, outcome domain, measure type, time horizon, and statistical analysis were also recorded. **Results:** Fifty-two observational studies met inclusion criteria. Twenty-five unique quantitative and 28 unique qualitative outcomes were identified. Ninety-six unique outcome measures were identified. The most frequently utilized outcomes were survival of replanted digit (38/52), sensation (22/52), and cold intolerance (13/52). Six survival, 7 sensitivity, and 7 cold intolerance measures were identified. Outcomes and measures were most diffuse in domains of motor function (5 outcomes and 15 measures) and quality of life (6 outcomes and 19 measures). Eighteen of 53 outcomes were endorsed by only 1 author. **Conclusion:** There is a lack of consensus on critical outcomes of replantation and how best to measure them. This creates an obstacle to understanding and comparing the effectiveness of various replantation interventions. We propose using stakeholder consensus via Delphi method to create a standardized outcome set for digital replantation. **Learning Objectives:**

(1) Understand the role of standardized outcomes in pooling data and drawing conclusions. (2) Be able to describe the Delphi method and its utility. (3) Given the domains discussed, consider which outcomes you find critical to replantation and which corresponding measures you endorse.

## 15CE—Canadian Expert Series

### New Developments in Flexor Tendon Repair and Rehab Now Consistently Get Good Results

D. Lalonde<sup>1</sup>

<sup>1</sup>Saint John, New Brunswick, Canada

There are now good large series of patients in China, England, Switzerland, and Canada with consistently very few ruptures and good to excellent range of motion after flexor tendon repair with a very low incidence of requirement for tenolysis. The most important keys to a good repair to decrease rupture and to decrease tenolysis rates are

- (1) Overtightening the repair with 10% to 30% bulkiness.
- (2) Appropriate venting of the A4 pulley, and in other cases, up to half of the A2 pulley so that a full range of active motion is not impeded by the pulleys before you close the skin.
- (3) Prevent rupture by performing intraoperative full fist flexion and extension testing to make sure there is no gapping before closing the skin. This is like testing blood flow after microvascular anastomosis to make sure there is no technical issue with the vascular repair.
- (4) Therapy after flexor tendon repair with half a fist of true active movement, NOT Kleinert and NOT full fist place and hold (Duran).
- (5) Four- to six-strand repair.

## Learning Objectives

Following this lecture, attendees will be able to

- (1) Get better results with therapy after flexor tendon repair by moving away from full fist place and hold to up to half a fist of true active movement.
  - (2) Decrease their tenolysis rates by appropriate venting of the A4 pulley, and in other cases, up to half of the A2 pulley.
  - (3) Decrease their rupture rates by overtightening the repair with 10% to 30% bulkiness and by intraoperative full fist flexion and extension testing to make sure there is no gapping before closing the skin.
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#### Disclosure of Interest

Consultant for ASSI Instruments.

### TIPS & PEARLS

#### 01 - Taking It to the Floor: The VRAM-Z Vaginal Commissuroplasty

G. Beauchemin<sup>1,\*</sup>, D. Tremblay<sup>1</sup>, M. Tardif<sup>1</sup>, and A. Chollet<sup>1</sup>

<sup>1</sup>Montreal, Quebec, Canada

Oncologic abdominoperineal resections including the posterior vaginal wall reconstructed by VRAM flap often bring unsatisfying aesthetic and functional results. The addition of a Z-plasty recreates the normal angle between the perineum and the posterior vaginal wall while reapproximating the labia majora at the posterior commissure.

### TIPS & PEARLS

#### 02 - Utilization of Autologous Platelet-Rich Plasma as a Replacement for Bone Grafting in Bilateral Nonunion of the Mandible

T. L. Teshima<sup>1</sup>

<sup>1</sup>Toronto, Ontario, Canada

Autologous platelet-rich plasma (PRP) has been shown to accelerate healing due to high concentrations of growth factors. A male with schizophrenia presented with bilateral nonunion angle fractures. Following sequestrectomy and rigid fixation, PRP was used as a substitute to bone grafting for 2-cm defects resulting in successful regeneration of bone.

### TIPS & PEARLS

#### 03 - An Anatomical Subunit Approximation Approach to Correction of Transverse Facial Clefts

R. Tse<sup>1,\*</sup>, and D. Fisher<sup>1</sup>

<sup>1</sup>Seattle, WA, USA

Numerous methods to reconstruct transverse facial clefts have been described but most are difficult to understand and the results are often unsatisfactory. We describe a simple,

anatomical, and easy to reproduce method of repair that produces favorable long-term results.

### TIPS & PEARLS

#### 04 - Mastopexy in Implant-Based Breast Reconstruction: Improving Breast Shape

P. Gdalevitch<sup>1</sup>

<sup>1</sup>Saint Eustache, Quebec, Canada

Implant-based breast reconstruction in large or ptotic breasts can be challenging. Improvements in breast shape often involve capsulorrhaphy and/or elevation of the inframammary fold. These techniques often flatten or square the breast. A simple mastopexy of both the skin and implant capsule can achieve an aesthetic breast shape.

### TIPS & PEARLS

#### 05 - Goldilocks Mastectomy—An Option for Breast Reconstruction

C. Temple-Oberle<sup>1,\*</sup>, and D. Mew<sup>1</sup>

<sup>1</sup>Calgary, Alberta

Women with multiple comorbidities, high BMI, and large ptotic breasts are not ideal candidates for immediate breast reconstruction post mastectomy. However, a modified form of Autoderm direct-to-implant breast reconstruction, sans implant, can provide an acceptable result with a minimal increase in risk beyond mastectomy itself. Technical pearls will be described.

### I5E0 - EYE-OPENER SESSION

#### Breast Reduction: A Reappraisal

E. Hall-Findlay, MD, FRCSC<sup>1</sup>

<sup>1</sup>Banff, Alberta, Canada

The workshop will review breast reduction techniques and the changes that the speaker has made over the years to provide consistent, good, long-lasting results for patients.

### Learning Objectives

1. The participants will be able to identify the advantages and disadvantages of the various breast reduction techniques that are currently being used.
2. The participants will be able to describe the blood supply to the breast and its application to the design and creation of pedicles for the nipple-areolar complex.
3. The participants will be able to learn about the principles involved in achieving good results.
4. The participants will be able to identify which techniques are best for which patients.

## 16 - The Risk of Waiting: Breast Cancer Development in BRCA+ Patients Awaiting Prophylactic Mastectomy and Immediate Breast Reconstruction

K. Slater<sup>1,\*</sup>, E. Bovill<sup>1</sup>, R. Cheifetz<sup>1</sup>, S. Chia<sup>1</sup>, P. Brasher<sup>1</sup>, and S. Macadam<sup>1</sup>

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**Purpose:** To examine wait times for BRCA mutation carriers undergoing prophylactic mastectomy (PM) and immediate breast reconstruction and determine the incidence of breast cancer in British Columbian patients seeking PM with immediate reconstruction. **Methods:** A retrospective review of BRCA1/2 mutation carriers identified by the British Columbia Cancer Agency (BCCA) between 2000 and 2012 was performed. Patients were identified through the BCCA Hereditary Cancer Program. Patients with a breast cancer diagnosis at the time of genetic testing were excluded. Charts were reviewed for demographic information, breast cancer risk factors, consultation and surgical dates, and surgical details. **Results:** A total of 333 women identified as BRCA1/2 mutation carriers by BCCA from 2000 to 2012 met our eligibility criteria. A total of 201 patients elected for high-risk surveillance, 7 underwent PM, and 125 sought PM with immediate breast reconstruction (PMIBR). Time from BRCA diagnosis to surgery was 17.1 months in the PM group and 29.6 months in the PMIBR group. Wait time from referral to surgery for PM was 4.3 months, compared to 20.8 months for PMIBR. No patients in the PM group developed breast cancer. Breast cancer incidence in the PMIBR group was 6%, occurring a median of 32 months from BRCA mutation diagnosis. **Conclusion:** BRCA mutation carriers that chose PMIBR waited a median of 30 months from mutation diagnosis to surgery. Six percent were diagnosed with DCIS or invasive ductal carcinoma while awaiting surgery. Wait list prioritization and dedicated operative time as well as strategies to facilitate decision-making should be targeted to this patient population in an effort to decrease their breast cancer incidence. **Learning Objectives:** Participants will be able to (1) describe the risk of breast cancer development in BRCA+ patients, (2) understand the importance of timely access to PM and immediate breast reconstruction, and (3) describe strategies to reduce wait times for PMIBR.

## 17 - Intraoperative Autoderm Decontamination for Use in Immediate Single-Stage Direct-to-Implant Breast Reconstruction

J. Diaz-Abele<sup>1,\*</sup>, M. Brichacek<sup>1</sup>, K. Dalke<sup>1</sup>, T. Hayakawa<sup>1</sup>, and E. Buchel<sup>1</sup>

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**Purpose:** Acellular dermal matrix (ADM) in direct-to-implant reconstruction for breast cancer has become the standard of

care due to superior cosmetic results and decreased capsular contracture but is cost prohibitive at thousands of dollars per sheet. Although more economic, the use of patient's own dermis (Autoderm) instead of ADM has an undescribed sterility. Sterility is significant as bacterial contamination may lead to infection, capsular contraction, or even breast implant-associated anaplastic large cell lymphoma. This study aimed to determine the level of sterility and optimal decontamination protocol of patient's Autoderm. **Methods:** A prospective control pilot study of 140 samples from 20 different DIEP breast cancer reconstruction patients was performed. Seven deepithelialized dermal samples (2 × 1 cm in size) per patient were collected from the excess abdominal tissue and treated with 6 different decontamination protocols and a control. Samples were exposed to the solutions (povidone-iodine, chlorhexidine, and cefazolin/tobramycin/bacitracin) for 15 minutes; half of the samples were kept still and half were agitated at 150 rpm for 15 minutes. The control was NaCl 0.9% with no agitation. The solution was removed from the samples and the samples were sent to the microbiology lab for aerobic colony count cultures. Patient's demographic data were also collected. **Results:** None of the experimental groups had aerobic bacterial growth. Some control samples (treated in NaCl 0.9% with no agitation) had aerobic bacterial growth. **Conclusion:** This study suggests povidone-iodine, chlorhexidine, and cefazolin/tobramycin/bacitracin are effective at sterilizing deepithelialized dermis, but saline is ineffective. The 3 studied solutions are equally effective at sterilizing the dermis. Tissue agitation in antimicrobial solution is unnecessary and leads to the same degree of sterility as no agitation. **Learning Objectives:** (1) Povidone-iodine, chlorhexidine, and cefazolin/tobramycin/bacitracin treatment for 15 minutes is effective at sterilizing Autoderm. (2) Agitation is unnecessary. (3) Autoderm may be a potential alternative to ADM.

## 18 - Quality of Life Comparison in Early Breast Cancer Patients Treated With Breast Conserving Surgery Versus Mastectomy Alone Versus Mastectomy With Immediate Breast Reconstruction

H. Retrouvey<sup>1,\*</sup>, S. Hofer<sup>1</sup>, K. Metcalfe<sup>1</sup>, D. McCready<sup>1</sup>, A. O'Neill<sup>1</sup>, and T. Zhong<sup>1</sup>

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**Purpose:** To prospectively compare the changes in satisfaction and quality of life between breast conserving surgery (BCT), mastectomy alone (MA), and mastectomy with immediate breast reconstruction (IBR) in patients with early-stage breast cancer. **Methods:** All patients with early-stage (stage 0, 1, and 2) breast cancer treated between 2015 and 2017 at 1 institution were enrolled in this prospective cohort study. Their quality of life and satisfaction outcomes were compared using the BREAST-Q breast satisfaction and psychosocial well-being scales at 12 months with multivariate linear regression.

**Results:** A total of 242 patients with early-stage breast cancer were prospectively enrolled; 107 underwent BCT, 56 MA, and 79 IBR. The 3 groups had similar baseline scores. At 12 months, BCT patients reported the statistically higher breast satisfaction (71/100) compared to IBR (57/100), while MA reported the lowest (48/100),  $P < .0001$ . Similarly, BCT patients scored highest on the psychosocial well-being subscale (77/100) compared to IBR (69/100) and MA (60/100),  $P < .0001$ . On the multivariable regression, MA and IBR patients experienced significantly lower breast satisfaction compared to BCT ( $P < .0001$  and  $.006$ ). MA also experienced lower satisfaction compared to IBR ( $P = .02$ ). With regard to psychosocial well-being, MA patients experienced lower well-being compared to BCT and IBR ( $P < .0001$  and  $P = .003$ ), while the difference between BCT and IBR was not significant ( $P = .31$ ). **Conclusion:** This large prospective study highlights that breast satisfaction and psychosocial well-being at 12 months are significantly reduced in MA compared to BCT or IBR, but are no different for BCT and IBR in patients with early-stage breast cancer. These results support the use of BCT and IBR to optimize long-term quality of life and breast satisfaction for patients with early-stage breast cancer in whom the 3 surgical procedures yield similar oncologic outcomes. **Learning Objectives:** Compare breast satisfaction and quality of life outcomes after breast cancer surgery.

## 19 - Examining Variables That Influence Breast Reconstruction After Mastectomy in Alberta

C. Wilkes<sup>1,\*</sup>, J. Bachman<sup>1</sup>, R. Rosychuk<sup>1</sup>, and L. Korus<sup>1</sup>

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**Purpose:** Breast cancer is the most common cancer affecting Canadian women. Approximately half of the women treated receive a mastectomy. There is a paucity of data examining which factors impact the likelihood of undergoing reconstruction within Alberta. Such data could be significant in implementing future strategies to improve reconstruction rates. Our study aims to identify these factors. **Methods:** Patients with breast cancer treated with a mastectomy were identified through the Alberta Cancer Registry from 2002 to 2015. These patients were cross-referenced with databases to identify which women underwent reconstructive surgery with a follow-up end date of July 2017. Reconstructed and nonreconstructed groups were compared on individual factors to determine their impact on reconstruction rates. This included mean age (2-sample  $t$  test), cancer stage (Fisher exact test), as well as geographic location, chemotherapy, radiation therapy, and pre-existing comorbidities (2-sample  $z$  tests of proportion). **Results:** A total of 15 327 women underwent a mastectomy between 2002 and 2015, and 3657 reconstructive procedures were performed. Age, geographic location, chemotherapy, radiation, and pre-existing comorbidities were all variables that statistically significantly influenced the likelihood of undergoing

reconstruction ( $P < .001$  all variables). The proportion of participants initiating reconstruction at 1-, 5-, and 10-year post-mastectomy was 45%, 95%, and 99%, respectively.

**Conclusions:** The rate of breast reconstruction post-mastectomy in Alberta patients with breast cancer is estimated at 24%. This rate is higher than the current literature in Canada. At 1-year post-mastectomy, only 45% of patients receiving reconstruction actually underwent surgery, which demonstrates the need for longer term follow-up to capture true reconstruction rates. Comparisons between the groups identified factors influencing the likelihood of undergoing breast reconstruction (younger age, urban residence, no chemotherapy/radiation therapy/comorbidities). Further analyses will assess whether these factors are all statistically significant in multivariable models. **Learning Objective:** Determine which factors influence the likelihood of receiving post-mastectomy reconstructive surgery and how quickly reconstructive surgery is initiated in Alberta.

## 20 - Pre-Consultation Educational Group Intervention Reduces Decisional Conflict in Women Undergoing Delayed Post-Mastectomy Breast Reconstruction

W. Quong<sup>1,\*</sup>, I. Kerrebijn<sup>1</sup>, A. O'Neill<sup>1</sup>, S. Hofer<sup>1</sup>, K. Metcalf<sup>1</sup>, and T. Zhong<sup>1</sup>

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**Purpose:** Choosing to pursue post-mastectomy breast reconstruction (PMBR), is a challenging, preference-sensitive decision. It is therefore paramount to optimize decision quality through ensuring patients' knowledge and aligning selected treatments with their personal preferences. This study assessed the effects of a pre-consultation educational group intervention (PEGI) on PMBR knowledge, state-trait anxiety, and decisional conflict (patient uncertainty in decision-making). **Methods:** This phase III randomized controlled trial assessed effects of PEGI in women undergoing delayed PMBR or prophylactic mastectomy with immediate PMBR. Women either underwent routine education or routine education with PEGI prior to consultation. PEGI comprised of presentations from a plastic surgeon and nurse, a values-clarification exercise, and shared experiences from PMBR patients. Prior to consultation, and 1-week following consultation, outcome measures were assessed using validated instruments including the Decisional Conflict Scale, Spielberger State-Trait Anxiety Inventory, and BREAST-Q. **Results:** From March 2014 to December 2015, 301 referrals to University Health Network were screened, with 219 women meeting eligibility ( $\geq 18$  years of age, referred for PMBR, either delayed or prophylactic with immediate reconstruction). One hundred fifty-six women were recruited and randomized. Treatment fidelity was 96%, and retention 88%. At baseline, there were no significant demographic nor clinical differences between groups. Similarly, knowledge, state-trait anxiety, and decisional conflict were comparable. At follow-up, both groups significantly gained knowledge about PMBR,

with a greater increase where women also received PEGI ( $P < .001$ ). Decisional conflict and state-trait anxiety were not different between groups at follow-up. Subgroup analysis however revealed significant improvement in decisional conflict in women considering delayed PMBR after PEGI ( $P = .035$ ). **Conclusion:** PEGI improves decision-making quality by improving knowledge and provides the additional benefit of reducing decisional conflict in women undergoing delayed reconstruction. **Learning Objectives:** (1) Describe the effect of PEGI on knowledge, anxiety, and decisional conflict in women considering undergoing delayed versus prophylactic with immediate PMBR.

## 21 - Oncoplastic Breast Surgery Combining With Immediate Contralateral Breast Reduction: Oncological Safety, Surgical Outcome, and Patient Satisfaction

H. St. Denis-Katz<sup>1,\*</sup>, A. Fitzpatrick<sup>1</sup>, L. Gresham<sup>1</sup>, and J. Zhang<sup>1</sup>

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**Purpose:** Breast reconstruction and preservation of breast appearance post breast cancer ablation correlates with better psychosocial outcomes. There is limited literature discussing breast surgical oncologists and plastic surgeons performing oncoplastic breast conserving surgery with immediate contralateral balancing breast reduction. This study examines oncological safety, surgical outcome, and patient satisfaction in these patients. **Method:** This is a retrospective chart review of patients treated with oncoplastic breast conserving surgery and immediate contralateral breast reduction at a single breast cancer centre. Demographic, clinicopathologic characteristics, complications, and BREAST-Q surveys preoperatively and at 3-month follow-up were analyzed. **Results:** Forty-eight patients underwent oncoplastic breast surgery and contralateral reduction between October 2014 and December 2017. Mean age was 56 years with mean follow-up of 58 weeks. Complete excision with negative margins was obtained in 42 (87.5%) patients. Positive margins were found in 6 (12.5%) patients; all went on repeat lumpectomy with clear margins. No patients had local recurrence. The most common tumor histopathologies were invasive ductal carcinoma (58.3%). The mean lumpectomy size was 439 g and reduction size was 472 g. Wise pattern reduction (64.6%) with superomedial pedicle (66.7%) was most commonly used for the reduction side. Rates of complications were 18 (37.5%) having minor complication (defined as being managed as an outpatient) and 1 (2.1%) having a major complication requiring hospitalization. BREAST-Q scores improved at 3-month follow-up for all areas including physical well-being, sexual well-being, and most significantly in satisfaction with breasts and psychological well-being. **Conclusions:** Oncoplastic surgery provides safe and reliable treatment for breast cancer, and combining that with contralateral breast reduction provides immediate reconstruction with good aesthetic outcome and high patient

satisfaction. **Learning Objectives:** Participants will be able to understand the role of oncoplastic breast surgery combining with immediate contralateral breast reduction in patients with breast cancer.

## 22 - Outcome Analysis of AlloDerm and DermACELL in Breast Reconstruction

A. Ghumman<sup>1,\*</sup>, A. Arnaout<sup>1</sup>, and J. Zhang<sup>1</sup>

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**Background:** Acellular dermal matrices (ADM) have been integral in breast reconstruction for many years. AlloDerm has been the most commonly used ADM; however, newer ADMs have entered the market and there is little literature comparing them. DermACELL is a new ADM that is being increasingly used in breast surgery. This study aims to compare DermACELL and AlloDerm and determine what, if any, differences in outcomes that have resulted. **Methods:** Between December 2015 and February 2017, all consecutive patients undergoing breast reconstruction surgery performed by 1 plastic surgeon using ADM were identified and included in the study. Patient demographics, cancer treatment, size of acellular dermal matrix, size of implant at the time of ADM placement, complications, and time to drain removal were all recorded. **Results:** A total of 45 patients and 53 breasts were identified as having undergone breast reconstruction surgery with either AlloDerm ( $n = 27$  breasts) or DermACELL ( $n = 26$  breasts). The overall rate of explantation was 7.4% in the AlloDerm group and was 4% in the DermACELL group ( $P = 1.00$ ). None of the explantations occurred in radiated breasts. Of the AlloDerm group, 7.4% developed postoperative seroma or hematoma, while neither occurred in the DermACELL group (0.491). The rate of infection was 3.7% in the AlloDerm cohort compared to no infections in the DermACELL group ( $P = 1.00$ ). Time to drain removal was comparable between the groups at  $12.3 \pm 4.60$  days in the AlloDerm group and  $12.8 \pm 7.20$  days in the DermACELL group ( $P = .89$ ). **Conclusions:** Outcomes between the 2 groups were similar. Cost, availability, and surgeon preference are factors to consider in selection of an acellular dermal matrix for breast reconstruction. **Learning Objectives:** (1) Recognize role for acellular dermal matrix in breast reconstruction and (2) appreciate the difference in preparation, processing, and outcomes with different ADMs.

## 23 - Mastectomy Flap Necrosis After Nipple-Sparing Mastectomy and Immediate Implant-Based Reconstruction: An Evaluation of Tumescence and Sharp Dissection Technique on Surgical Outcomes

T. Ng<sup>1,\*</sup>, D. Ross<sup>1</sup>, B. Evans<sup>1</sup>, A. Grant<sup>1</sup>, M. Brackstone<sup>1</sup>, and C. Doherty<sup>1</sup>

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**Purpose:** Mastectomy flap necrosis is a known complication of nipple-sparing mastectomy and immediate breast reconstruction. This study compares outcomes between 2 mastectomy techniques: tumescent infiltration and sharp dissection versus conventional electrocautery. **Methods:** Consecutive patients who underwent mastectomy with immediate reconstruction with either expander or implant over a 36-month period were reviewed. A 1-month washout period was observed before and after the sharp dissection technique was introduced. All mastectomies were performed by 1 of 7 experienced general surgeons. Demographic, oncologic, and perioperative details were recorded. The primary outcome of interest was full-thickness mastectomy flap necrosis. Secondary outcomes included the need for further surgery and explantation of prosthesis. Statistical analysis was performed using STATA. Student *t* test,  $\chi^2$ , or Fisher exact tests were used for continuous and categorical variables. **Results:** A total of 141 (75 patients) breasts met inclusion criteria for review. Both groups were similar with regard to age, BMI, radiation status, and mastectomy weight. Implant size was larger in the sharp group (449.4 vs 335.9 g). Seven patients had mastectomy flap necrosis (2 sharp, 5 cautery; *P* = .24; overall incidence 5%). All of these patients underwent attempted salvage, with 4 patients requiring implant explantation. Procedure time was not statistically different between groups (187 vs 185 minutes; *P* = .3). **Conclusion:** Tumescent and scissor dissection is a safe method for performing mastectomy prior to immediate breast reconstruction with a trend to less risk of mastectomy flap skin necrosis as compared to mastectomy done with electrocautery. **Learning Objectives:** Participants will be able to understand alternative methods of performing mastectomy prior to immediate prosthesis-based breast reconstruction.

## 24 - Characterizing Primary Fibroblasts in Breast Capsular Contracture Formation

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**Purpose:** Breast capsular contracture is a difficult complication occurring in up to 17% of implant-based reconstructions. The pathological switch that propels a “healthy capsule” toward contracture is multifactorial but remains incompletely characterized. The objective of this study is to identify differences in tissue histology and fibroblast subtypes from varying grades of breast capsular contracture. **Methods:** Twenty-five breast capsular tissue samples from 15 patients (8 primary augmentation, 7 breast reconstruction with 4 patients receiving radiation) undergoing capsulectomy or implant exchange were collected and grouped according to the Baker classification (grades 1 to 4). Capsular tissue was processed for histological analysis (H&E, Masson Trichrome, picrosirius red staining) to visualize capsular tissue architecture. Capsular tissue was sectioned into 0.5 cm pieces and incubated in DMEM media with

FBS to allow outgrowth of primary fibroblasts. Fibroblasts were stained for alpha-smooth muscle actin ( $\alpha$ SMA) and fibroblast activating protein (FAP) immunofluorescence to identify fibroblast subtypes. **Results:** Capsular tissue demonstrates densely organized parallel collagen architecture by H&E and Masson trichrome staining. Primary fibroblast outgrowth occurred by days 6 to 14. Fibroblasts from all capsule grades were successfully cultured and passaged, except from patients with previous radiation treatment. Analyses showed a trend toward decreased  $\alpha$ SMA and FAP expression and an increase in highly flattened senescent-like fibroblasts from higher capsular grades. **Conclusions:** Decreased  $\alpha$ SMA and FAP staining in higher contracture grades may indicate a higher proportion of senescent fibroblasts. These are non-replicative cells distinct from myofibroblasts that contribute to fibrosis by secreting pro-inflammatory/fibrotic cytokines. The inability to passage fibroblasts from irradiated capsule samples further supports the role of senescent fibroblasts in contracture formation. Understanding this fibroblast type will help to target therapeutic non-surgical options for capsular contracture. **Learning Objectives:** (1) Understand the histological differences of capsules from varying Baker grades. (2) Describe different primary fibroblast populations seen from capsular tissue.

## 25 - Epidural Nerve Blocks Increase Intraoperative Vasopressor Consumption and Delay Surgical Start Time Compared To General Anesthesia Alone in DIEP Free Flap Breast Reconstruction

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**Purpose:** The use of epidural anesthesia (EA) as an adjunct to general anesthesia (GA) has been widely encouraged in abdominal and thoracic surgeries and recently shown efficacy in autologous breast reconstruction. While the utility of reducing postoperative narcotic consumption, nausea, and length of stay in hospital cannot be understated, concerns remain as to whether these blocks reduce OR efficiency by delaying case start time and whether block-induced hypotension is associated with increased intraoperative vasopressor requirements. The purpose of this study was to examine the effectiveness of epidural blocks in patients undergoing deep inferior epigastric perforator (DIEP) flap breast reconstruction. **Methods:** A retrospective analysis from 2015 to 2017 of patients who underwent DIEP flap reconstruction under GA, with and without EA and no supplementary local anesthetic. Electronic records were analyzed for patient demographics, intraoperative data, and postoperative outcomes. Primary outcome was 48-hour narcotic usage. Secondary outcomes were intraoperative vasopressor consumption, surgical delay time, and safety. **Results:** Fifty-one patients underwent DIEP reconstruction, 40 (78%) underwent EA in addition to GA, and 11 (22%) underwent GA alone.

There was a significant delay in OR start time in the EA/GA group (67 vs 43 minutes,  $P = .001$ .) Patients in the EA/GA group also had a statistically significant increase in vasopressor use ( $n = 33$  vs  $n = 5$ ,  $P = .021$ ). Postoperatively, patients who received an epidural block had a reduced average pain score (1 vs 2,  $P = .05$ ), but there was no difference in 48-hour narcotic usage. **Conclusions:** Epidural blocks improve average postoperative pain, while increasing intraoperative vasopressor use and delaying the start time of the case. The benefits of improved pain control must continue to be weighed against the potential for increased surgical complications, as well as increased costs to the health-care system. **Learning Objectives:** Participants will be able to appreciate the clinical implications of epidural blocks in DIEP flap breast reconstruction.

## 26 - The Role of Microsurgical Technique in Hepatic Artery Reconstruction in Pediatric Liver Transplantation

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**Purpose:** Failure of hepatic artery (HA) reconstruction in pediatric liver transplantation can lead to biliary complications, graft necrosis, and failure. Microsurgical reconstruction of the hepatic artery is now being employed by many centers in an attempt to minimize these complications. The purpose of this study is to report the outcomes of a single-centre experience in pediatric liver transplantation with the institution of microsurgical HA reconstruction. **Methods:** A retrospective review was performed of pediatric orthotopic liver transplantations performed in Edmonton between 1990 to present. Patients were divided into 2 groups: cohort 1 underwent HA reconstruction by the primary transplant surgeon and cohort 2 had reconstruction of the HA performed by a plastic surgeon using microsurgical technique. Primary outcomes were vascular including hepatic artery thrombosis (HAT), hepatic artery stenosis, anastomotic bleeding, and arterial ischemic time. Secondary outcomes included length of PICU stay, length of hospital stay, graft survival, and overall survival. **Results:** A total of 223 pediatric patients underwent liver transplantation (cohort 1 = 180; cohort 2 = 43). While operative times (498 vs 414 minutes,  $P = .001$ ) and arterial ischemic times (94 vs 43 minutes,  $P = .000$ ) were higher in cohort 2, the use of microsurgical technique for HA reconstruction resulted in significantly lower vascular complications (HAT 2.3% vs 12.8%,  $P = .047$ ) and a trend toward improved graft survival (14% vs 24%,  $P = .157$ ). PICU and hospital stay were similar between the 2 groups. **Conclusions:** The institution of microsurgical hepatic artery reconstruction in pediatric orthotopic liver transplantation has resulted in a significant decrease in vascular complications and improved graft survival, providing evidence for the implementation of this technique for pediatric liver transplantations. **Learning Objectives:** (1) Hepatic artery reconstruction in pediatric liver transplantation is technically

challenging. (2) A multidisciplinary approach including transplant and plastic surgeons leads to improved outcomes for pediatric patients.

## 27 - Early Dangling Protocol for Lower Limb Free Flap Reconstruction

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**Purpose:** With the paucity of locally available tissue, free flaps are often necessary in lower limb reconstruction after trauma, burn, oncological resection, complex wounds, and infections. Given position-dependent fluctuations in arterial pressure, venous pooling, and edema, dangling regimes habituate flaps to their new environment. To date, there is no consensus regarding the postoperative day for dangling initiation, its duration, or the rate of progression. The purpose of this study is to present an aggressive protocol which combines early postoperative dangling with wrapping and intermittent monitoring of lower limb free flaps. **Methods:** Given that senior authors have been using this protocol successfully for a number of years, data were retrospectively gathered and analyzed for all patients meeting inclusion and exclusion criteria. Prior to dangling, extremities were wrapped in appropriately sized Tubi-grip. Dangling was begun on postoperative day 3 and was individually tailored to flap response. Flaps were monitored for temperature, color, turgor, capillary refill, and Doppler signal when available. Duration of dangling began with 15 minutes 3 times a day. Daily increments of 15 and then 30 minutes per session were instituted until 2 hours were tolerated. Patients were sent home when tolerating more than 45 minutes of dangling. **Results:** A total of 17 cases are included in this study. Patient demographics, comorbidities, indication for free flap, and type of free-flap performed are reported. All flaps survived the dangling protocol. Minor complications such as partial dehiscence were managed conservatively. Secondary outcomes such as duration of hospital stay are also discussed. **Conclusion:** The authors present an early and aggressive dangling protocol for lower limb microsurgical free flap reconstruction. Excellent outcomes are reported and hospital length of stay is minimized. **Learning objectives:** At the end of this session, the learner will recognize the advantages of early, aggressive dangling. He will also recognize signs of free-flap failure and know how to take appropriate action.

## 28 - The Effect of Padded Adhesive Dressings and Body Position on Sacral Interface Pressure

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**Purpose:** Padded adhesive dressings are being increasingly used to prevent pressure ulcers but the reduction in interface pressure these bandages provide on the sacrum across different body positions is not known. It was hypothesized that there would be a reduction in peak interface pressure for a supine position but that this would be reduced in the 30° and sitting positions. **Methods:** Twenty healthy adult volunteers of both sexes were recruited to this study. Study participants sat on a pressure-sensing mat on a hard surface in 3 positions: (1) supine, (2) supine with the back on a 30° wedge, and (3) sitting. Baseline measurements were taken and then repeated with a padded adhesive dressing (Mepilex Gentle Border Sacrum) on the sacrum. Age, sex, and body mass index (BMI) were collected for all participants. Peak pressures were compared across positions using linear mixed effects modelling. Demographic data were analyzed using descriptive statistics and normality testing. **Results:** Eleven females and 9 males, ages  $25.5 \pm 3.9$  (range 18-37) and BMIs  $22.2 \pm 2.1$  (range 17.9-25.9), normally distributed. After controlling for sex and age, BMI did not significantly impact peak pressure ( $\chi^2 = 0$ ,  $P = 1$ ). After controlling for sex, age, and BMI, the effect of position was statistically significant ( $\chi^2 = 59.7$ ,  $P < .001$ ), with a post hoc Tukey test revealing greater peak pressures supine ( $321.4 \pm 169.3$  mm Hg) compared with the 30° ( $101.6 \pm 128.1$  mm Hg,  $t = 7.02$ ,  $P < .001$ ) and sitting ( $128.1 \pm 60.8$  mm Hg,  $t = 7.96$ ,  $P < .001$ ). The presence of a dressing did not significantly impact peak pressure (bare  $177.5 \pm 165.1$  mm Hg vs Mepilex  $191.3 \pm 156.9$  mm Hg,  $\chi^2 = .52$ ,  $P = .47$ ). **Conclusions:** Contrary to our hypothesis, a padded dressing had no effect on interface pressure in any position. Pressure on the sacrum was highest in the supine position, but in all positions pressure was well above the known capillary closing pressure of 32 mm Hg, demonstrating the importance of offloading and the need for additional interventions to relieve pressure. **Learning Objectives:** Understand the factors that influence pressure on the sacrum.

## 29 - A Quality Improvement Project Incorporating Preoperative Warming to Prevent Perioperative Hypothermia in Major Burns

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**Purpose:** Patients with extensive burn injuries are susceptible to a host of accompanying adverse effects should they develop perioperative hypothermia, which occurs in up to one-fourth of all major burn cases. This quality improvement project aimed to reduce the incidence of perioperative hypothermia to below 15% of cases in patients with major burn injury within a year period. **Methodology:** A baseline diagnostic phase was undertaken. Preoperative forced air warming with a "Bair Hugger" was identified as a sound change initiative. The primary outcome measure was the percentage of cases of perioperative

hypothermia ( $<36^\circ\text{C}$ ), utilizing a time series design for the period between November 2016 and October 2017. **Results:** Fifty-three patients with major burn injury were admitted over the year period. Of these, 40 patients required 127 operative procedures. Their mean age was 48.23 years, their mean TBSA was 27.65% (range 15%-75%), and their mean length of hospital stay was 31.2 days. After the introduction of prewarming, the proportion of cases of inadvertent hypothermia reduced to 13.77%, with special cause variation, from 24%. The final temperature correlated with the lowest temperature recorded in only 32% of cases. No significant balancing measures were identified, nor any undue costs incurred. **Conclusions:** The inevitable drop in temperature is ameliorated by sound intraoperative practices. This initiative demonstrated the additional benefits of the broad application of preoperative warming in the context of major acute burn surgery. To consolidate the prewarming initiative, we have introduced a standard order within our admission order sets to include preoperative warming for all eligible patients. **Learning Objective:** (1) To demonstrate the benefits of preoperative warming in burn patients.

## 30 - An Early Psychometric Look at the SCAR-Q: A New Patient-Reported Outcome Instrument for Scars

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**Purpose:** Burns, surgeries, and trauma result in millions of scars annually. Scars have been shown to have wide-ranging effects on quality of life. There is no internationally validated, rigorously tested PRO instrument that can be used to assess scar outcomes of all etiologies in both children and adults. This abstract aims to describe the early psychometric findings of the SCAR-Q. **Method:** Between April 3 to May 5, 2017 data were collected from 2 outpatient clinics in New Zealand. Participants completed a questionnaire booklet with demographic and clinical questions and the SCAR-Q (Appearance, Symptom, and Psychosocial Impact). Rasch Measurement Theory analysis was conducted using RUMM2030 software to take an early look at SCAR-Q scales in terms of reliability, threshold for item response options, and targeting. **Results:** A total of 237 patients were consented and 218 patients completed the survey results in full. The sample included 205 (94%) adults and 112 (51%) females. The scars were mainly visible ( $n = 131$ , 60%) and were caused by surgery ( $n = 108$ , 50%) or trauma ( $n = 84$ , 39%). All three scales had good to excellent reliability (PSI 0.81-0.89). Response options varied between scales. The Appearance Scale had no disordering of response, while the Symptom and Psychosocial Impact Scales showed some disordering suggesting overabundance of response options. In terms of targeting, a ceiling effect was found for all 3 scales suggesting satisfaction with one's scar. **Conclusions:** This

preliminary RMT analysis showed that the 3 SCAR-Q scales performed well with in the New Zealand sample, with good to excellent reliability. The next step is to continue the field test study and recruit a large international sample of patients that includes children aged 8 years and older. SCAR-Q will be the first comprehensive PRO instrument used in all scar etiologies (traumatic, surgical, and burn) and for children (8/+) and adults. **Learning Objectives:** (1) Describe field-testing a PRO instrument. (2) Describe psychometric properties of a PRO instrument.

### 31 - The Fragility of Statistically Significant Findings From Randomized Controlled Trials in Plastic Surgery

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**Purpose:** The *P* value is the most commonly used metric to evaluate the results of a randomized controlled trial (RCT). However, a statistically significant result can sometimes rely on a small number of events and the *P* value may lose statistical significance with only a few changes in event or outcome status. The fragility index has been proposed as a complementary measure to interpret the robustness of trial findings. It measures the number of events that an RCT result relies on to maintain statistical significance. The aim of this systematic review is to determine the robustness of statistically significant RCTs in the plastic surgery literature. **Method:** A systematic literature search was conducted to identify RCTs published between 2000 and 2017 that reported a statistically significant dichotomous outcome ( $P < .05$ ) in the 15 highest impact plastic surgery journals. Randomized controlled trial characteristics were extracted and the fragility index of each study was calculated using Fisher exact test. **Results:** Of 546 potentially eligible trials, 90 RCTs met the inclusion criteria. The median sample size was 65 patients (mean = 93.9, min = 10, max = 688) and a median of 20 total events (mean = 25.5, min = 2, max = 100). The median fragility index was 1 (mean = 2.9, min = 0, max = 23), meaning that statistical significance would be lost if a single patient had a change in event status. Additionally, 56 of 90 (62%) RCTs demonstrated a fragility index of less than 3. The fragility index was 0 in 24 of 90 (27%) RCTs, meaning the outcome immediately lost statistical significance upon calculation of the *P* value using Fisher exact test. **Conclusion:** The statistical significance of RCTs in plastic surgery demonstrated substantial fragility as statistically significant results were found to hinge on a small number of events. The fragility index offers an intuitive and simple metric to complement the *P* value and help identify fragile results. **Learning Objectives:** (1) The audience will learn about the fragility index, a metric that describes the robustness of statistically significant results, and is intended to complement *P* values and 95% confidence intervals when

interpreting the results of an RCT. (2) The audience will learn how to use the fragility index to make more informed decisions about the confidence warranted by RCT results.

### 32 - Health Utility Values in Breast Reconstruction: A Systematic Review

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**Purpose:** Breast reconstruction involves a spectrum of techniques with varying costs and outcomes. In the setting of limited resources, cost-effectiveness analyses (CEA) identify interventions resulting in the greatest quality of life improvement at the lowest cost. Health utility values are used to assess the outcomes of therapeutic interventions. For breast reconstruction, such values are variable across the literature. The purpose of this study is to identify utility values relevant to breast reconstruction and use meta-analysis to generate estimates. **Method:** A systematic review was conducted of MEDLINE and EMBASE for all CEAs in breast reconstruction. Results were screened by 2 independent reviewers and disagreements resolved by consensus. Possible cost utility analyses and reports of utility metrics were reviewed in full text. Studies that generated utility values were included in the analysis and pooled estimates were generated. **Results:** Of 2285 articles screened, 36 were reviewed in full-text stage and 20 articles reporting utilities for 30 health states were included. Instruments used to generate utilities included time trade-off, visual analog scale (VAS), BREAST-Q, and HALex in 5, 10, 2, and 2 studies, respectively. Utility values for successful surgery with implant-based and autologous reconstruction were 0.70 (95% CI: 0.63-0.75) and 0.86 (95% CI: 0.83-0.88), respectively. Utility values for reconstruction with complications ranged from 0.57 (95% CI: 0.48-0.66) for total flap loss to 0.71 (95% CI: 0.60-0.82) for mastectomy flap necrosis. **Conclusions:** Utility values in breast reconstruction are most commonly generated using VAS. Specific utility values are variable and affected by postoperative outcome. This analysis can serve as a reference for utilities and health states for future breast CEA. **Learning Objectives:** (1) Understand the role of utility values as a measure of outcome following breast reconstruction. (2) Identify utility values that can be used in future cost-utility analyses in breast reconstruction.

### 33 - Avoiding Breach of Patient Confidentiality: Trial of a Smart Phone Application That Enables Secure Clinical Photography and Communication

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**Purpose:** To evaluate a smart phone application for clinical photography that prioritizes and facilitates patient security.



**Method:** Ethics was obtained to trial the application Share-smart. Calgary plastic surgeons/residents used the application for clinical photography and communication. Surveys gauging the application usability, incorporated consent process, and photograph storage/sharing were then sent to surgeons and patients. **Results:** Over a 1-year trial period, 16 Calgary plastic surgeons and 22 residents used the application to photograph 84 patients. Half (55%) of the patients completed the survey. The majority of patients found the applications consent process acceptable (89%) and felt their photograph was secure (93%). Over half (66%) of surgeons/residents completed the survey and would use the application as is (64%) or with modifications (32%). The consent process was felt to be superior (73%) or equivalent (23%) to participant's prior methods and was felt to resolve issues present with current photography practices of secure transmission and storage of photographs by 100% and 95% of respondents, respectively. Perceived limitations of the application included difficulties with use with poor cellphone service or Internet, decreased speed compared to current practices, the lack of a desktop platform, video capability, and ability to transmit the photograph directly to the patient's medical record. **Conclusions:** A smart phone clinical photography application addresses the risks of patient confidentiality breach present with current photography methods; broad implementation should be considered. **Learning Objectives:** (1) To understand the patient confidentiality issues with current clinical photography practices. (2) To review the role of a smart phone application to securely take, store, and transmit patient photographs.

### 34 - Comparison of Different Dosages and Volumes of Triamcinolone in the Treatment of Stenosing Tenosynovitis: A Prospective, Blinded, Randomized Trial

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**Purpose:** To compare symptom resolution and pain on injection between 2 dosages and volumes of triamcinolone in treating stenosing tenosynovitis. **Methods:** Patients were recruited at the Gordon and Leslie Diamond Centre between 2010 and 2018. Exclusion criteria were diabetes, rheumatoid arthritis, previous injection or surgery, and locked digits that were not actively correctable. Patients were randomized to receive the same concentration, but different dosage and volume of triamcinolone. Group A received 0.25 mL of triamcinolone 40 mg/mL, mixed with 0.25 mL of 1% lidocaine with epinephrine (10 mg of triamcinolone, 0.5 mL in total volume). Group B received 0.5 mL of triamcinolone 40 mg/mL, mixed with 0.5 mL of 1% lidocaine with epinephrine (20 mg of triamcinolone, 1 mL in total volume). Visual analog scale was used to assess pain on injection. Patients were prospectively examined by a blinded hand therapist at 2 and 4 weeks and by a blinded plastic surgeon at 6 weeks. The primary outcome measured was

complete resolution of symptoms (Quinnell grade 0) at 6 weeks. **Results:** One hundred ninety patients were recruited with 35 lost to follow-up. The mean age was 57.7 and 58.9% were females. The long finger was the most affected digit (37.1%) followed by the thumb (28%). N = 80 in group A and N = 75 in group B were included in statistical analysis. There is no difference between group A and group B in complete resolution of symptoms at 6 weeks (60.0% vs 61.3%;  $P = .49$ ) or in pain score on injection (4.7 vs 5.0;  $P = .43$ ). **Conclusion:** Triamcinolone 10 mg is as effective as 20 mg in the resolution of symptoms at 6 weeks. There is no difference in pain on injection among different volumes. **Learning Objectives:** (1) Triamcinolone is effective in treating stenosing tenosynovitis. (2) Lower dosage is just as effective in resolving symptoms at 6 weeks. (3) Pain on injection is independent of volume.

### 35 - Substantial Cost-Minimization of Metacarpal Fracture Fixation in Minor Surgery Versus the Main Operating Room

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**Purpose:** The objective of this study was (1) to compare the cost of performing metacarpal fracture fixation in minor surgery (MS) versus the main operating room (OR) at a tertiary care centre in Calgary, Alberta from the institutional perspective and (2) to identify the factors contributing to this difference. **Methods:** Data were extracted from the Operating Room Information System and the Business Advisory System by a financial analyst. All data were based on actual expenses from the 2016 to 2017 fiscal year and is reported in Canadian dollars. Fixed costs (surgeon and hardware costs) were excluded from the analysis. Non-fixed costs included staffing, supply, day surgery (DS), post-anesthesia care unit (PACU), and anesthesia (anesthesiologist and equipment) costs. **Results:** After surgeon and hardware costs were excluded, the average non-fixed cost of metacarpal fixation in MS was \$333, compared to \$4517 in the OR. Staffing costs are a major contributing factor to cost by location (\$100 in MS versus \$1311 in OR), largely attributable to 0.5 nursing staff per room in minor surgery compared to 3 nursing staff per room in the OR. Supply costs (minor tray vs case cart) are also greater for OR cases. The combined costs for DS (\$404), PACU (\$378), and anesthesia (\$695) totalled (\$1477) and are only incurred for OR cases. **Conclusion:** Repair of metacarpal fractures in minor surgery represents a substantial cost minimization strategy. Staffing and supply costs by location and the additional combined costs of DS, PACU, and anesthesia are all contributing factors. **Learning objective:** Identify the factors that contribute to cost minimization of metacarpal fracture repair in minor surgery.

### 36 - Outcomes of Secondary Combined Proximal Interphalangeal Joint Arthrolysis and Zone II Flexor Tenolysis

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**Purpose:** Post-traumatic tendon adhesions and proximal interphalangeal joint (PIPJ) capsular contractures may significantly reduce hand function. Traditional surgical management consists of a staged approach that prioritizes restoration of passive range of motion through surgical arthrolysis, prior to tenolysis for restoration of active range of motion (AROM). This staged approach is expensive and burdensome for patients. Our objective was to evaluate functional outcomes of single-stage combined PIPJ arthrolysis and zone II flexor tenolysis in patients with flexion contractures and restricted tendon gliding. **Methods:** A retrospective chart review (2010-2016) was performed for patients who underwent combined PIPJ arthrolysis and flexor tenolysis. Replantation and tendon graft cases were excluded. Surgical procedures were performed using local anesthesia with sedation and tourniquet. Data were collected on preoperative and postoperative AROM, total active motion (TAM), tip to distal palmar crease (DPC) distance, and grip strength. Functional outcomes were graded using the ASSH and modified Strickland scores. **Results:** Twelve patients (9 males:3 females) of median age 40 years with a total of 15 digits underwent concurrent PIPJ arthrolysis with pulley preserving flexor tenolysis a median of 10.1 months post-injury. At median follow-up of 4.0 months, there were statistically significant ( $P < .05$ ) improvements in median AROM ( $15^{\circ}$ - $70^{\circ}$ ), TAM ( $105^{\circ}$ - $223^{\circ}$ ), tip to DPC distance (6.0-2.0 cm), and grip strength (35%-54% of the unaffected hand). Modified Strickland score was good in 46% of digits and excellent in 38%. There were no tendon ruptures, surgical site infections, or devascularized digits. **Conclusion:** Proximal interphalangeal joint stiffness and flexion contractures are challenging complications of hand trauma. Although a complete return to pre-morbid ROM and function is rarely attained with surgery, good outcomes may be consistently achieved with secondary concurrent PIPJ arthrolysis and zone II flexor tenolysis. **Learning Objectives:** (1) Explain indications for PIP joint release. (2) List outcome measures following flexor tenolysis.

### 37 - Conditioning Electrical Stimulation for Motor and Sensory Recovery Following Peripheral Nerve Regeneration

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**Purpose:** Peripheral nerve regeneration following injury is often incomplete with significant personal and socioeconomic

costs. Four decades of research has shown that a conditioning lesion, or a nerve crush delivered prior to injury and repair, markedly accelerates nerve regrowth; however, intentionally injuring a nerve is unethical and precludes clinical translation. We hypothesize that preoperative conditioning electrical stimulation (CES) is a noninjurious, clinically feasible method of delivering a conditioning-like effect. **Methods:** The effects of CES were investigated on expression of regeneration-associated genes (RAGs), axonal growth, and sensorimotor behavioral outcomes. Sprague Dawley rats were divided based on the type of conditioning to the tibial nerve: CES, CCL, sham-CES controls, and unconditioned controls. Expression of RAGs (GAP43, BDNF, pCREB, and GFAP) were analyzed at 3 days post-conditioning. The length of regeneration was assessed at 7 days, and behavioral testing was performed at 7 weeks post-coaptation. **Results:** Similar patterns of RAG upregulation and axonal growth were found in animals conditioned with electrical stimulation and crush compared controls. Sensory testing (von Frey filament testing, intraepidermal nerve fiber density counts), gait analysis (toe spread evaluation, horizontal ladder testing), and gastrocnemius muscle reinnervation (muscle weight, neuromuscular junction analysis) were all significantly improved in the CES animals compared to not only the controls, but also the crush-conditioned cohort. Nerve conduction studies shows significantly greater CMAP amplitude in CES compared to controls. **Conclusion:** Our data support that preoperative electrical stimulation delivers a conditioning-like effect, with upregulation of RAGs, enhanced axonal outgrowth, and improved sensorimotor outcomes. As electrical stimulation has been shown to be safe and well-tolerated by patients, CES should be a clinically feasible intervention that can potentially improve the sensory and motor recovery of patients with peripheral nerve injury. **Learning Objectives:** (1) CES upregulates regeneration-associated genes, (2) CES enhances axon growth, and (3) CES improves sensorimotor outcomes.

### 38 - Time to Complete Muscle Reinnervation Following Distal Nerve Transfers—Results of Long-Term Follow-up

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**Purpose:** It is generally thought that the capacity for muscle reinnervation declines rapidly with time. Many surgeons consider a nerve transfer a failure if there is only minimal reinnervation by 2 years after surgery. In those cases, a secondary procedure would often be performed. However, anecdotally, reinnervation and functional recovery have been found to persist for a much longer period post-surgery. Therefore, the purpose of this case series is to follow distal nerve transfer patients in order to evaluate the extent of reinnervation and functional recovery beyond the 2-year postoperative period. **Methods:** Patients who underwent distal nerve transfers through the

Northern Peripheral Nerve Clinic in Alberta for an upper or lower limb peripheral nerve injury with follow-up for 3 or more years post-surgery were included. The extent of reinnervation was quantified using electrophysiological techniques and functional recovery was quantified through MRC grading. **Results:** As expected, preliminary data reveal signs of early reinnervation by 2 years after surgery. However, 10 of the patients followed demonstrated improvement in electrophysiological studies consistent with progressive reinnervation of target muscles well beyond the first 2 years post-surgery. Progressive reinnervation was mirrored by improvement in muscle strength with time. **Conclusions:** Findings from this case series indicates that the time needed for full reinnervation of the target muscles following distal nerve transfers in some patients may be much longer than traditionally believed. To avoid the pitfalls of performing secondary procedures prematurely, longer term follow-up of nerve transfer patients should be considered. **Learning Objectives:** (1) Re-evaluate the traditional follow-up time to assess success or failure of a distal nerve transfer procedure. (2) To analyze the pattern of reinnervation over time after distal nerve transfer.

### 39 - Clinical Outcomes of Nerve Transfers in Peroneal Nerve Palsy: A Systematic Review and Meta-Analysis

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**Purpose:** The study objective was to perform a systematic review and meta-analysis of the primary literature to assess the effectiveness of nerve transfer surgery in restoring ankle dorsiflexion in patients with peroneal nerve palsy (PNP). **Methods:** Methodology was registered with PROSPERO and PRISMA guidelines were followed. MEDLINE, EMBASE, and The Cochrane Library were systematically searched. English studies investigating the outcomes of nerve transfers in PNP were included. Two independent reviewers completed screening and data extraction. Methodological quality was evaluated with Newcastle-Ottawa Scale (NOS). Meta-analysis was performed using descriptive statistics, Kruskal-Wallis test, and Spearman's  $\rho$ . **Results:** Literature search identified 108 unique articles. Following screening, 14 full-text articles were reviewed—4 met inclusion criteria for qualitative synthesis and meta-analysis. All included studies were retrospective case series (mean NOS = 5.0/6.0). Overall, 41 patients underwent nerve transfer for PNP—mean age of 36.1 years, mean time to surgery of 6.3 months, and a mean follow-up of 19.0 months. Donor nerve was either tibial nerve branches/fascicles ( $n = 36$ ; 88%) or superficial peroneal nerve ( $n = 5$ ; 12%). Recipient nerve was either deep peroneal nerve ( $n = 24$ ; 59%) or tibialis anterior branch ( $n = 17$ ; 41%). Postoperative ankle dorsiflexion strength demonstrated a bimodal distribution with a mean Medical Research Council (MRC) of 2.1. There were no significant differences in dorsiflexion strength between injury

sites ( $P = .491$ ), injury mechanisms ( $P = .125$ ), donor ( $P = .066$ ), or recipient nerves ( $P = .496$ ). There were no significant correlations between dorsiflexion strength and patient age ( $P = .094$ ) or time to surgery ( $P = .493$ ). **Conclusions:** There is variability in dorsiflexion strength following nerve transfer in PNP, whereby there appear to be responders and non-responders. Further studies are needed to better define the role of nerve transfers in the management of peroneal nerve palsy. **Learning Objective:** Participants will understand the clinical outcomes of nerve transfers in PNP.

### 40 - Assessment of Aesthetic Core Procedural Competencies Among Canadian Plastic Surgery Residents

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**Purpose:** As plastic surgery training moves toward competency-based education, it is important to assess current exposure to core procedural competencies within the discipline. The purpose of this study is to identify the level of exposure to aesthetic procedures among Canadian plastic surgery residents, which can help enhance aesthetic surgery resident training. **Methods:** A retrospective review of aesthetic case log procedure data using 3 databases (T-Res, POWER, and New Innovations) from graduating residents at all 10 Canadian English-speaking plastic surgery training programs between 2004 and 2014 was completed. **Results:** A total of 6113 aesthetic procedures were logged by 55 graduating residents across Canada between 2004 and 2014 (average  $111.2 \pm 63.8$  procedures per resident). Thirty-two core and noncore aesthetic procedures were identified, with the most common (greatest average recorded case logs per resident) being breast augmentation ( $22.8 \pm 14.3$ ), abdominoplasty ( $16.1 \pm 12.8$ ), and mastopexy ( $13.2 \pm 9.6$ ). The remainder of procedures had less than 10 average recorded cases per resident. Most procedures were performed by first assistant (43.2%), followed by co-surgeon (32.0%) and then surgeon (16.5%). The percentage of graduating residents who self-reported competence scores of 5 (out of 5 on a Likert scale) was highest for lipoinjection (83.7%), liposuction (75.0%), mastopexy (68.1%), and abdominoplasty (65.4%) and lowest for face lift (13.0%) and primary open rhinoplasty (18.2%). **Conclusions:** This study identifies which aesthetic procedures Canadian graduating residents have greatest exposure to and feel more competent in, as well as procedures for curricular development with less exposure and personal competence. **Learning Objectives:** (1) Identify aesthetic surgery core procedural competencies and current exposure Canadian plastic surgery residents have to these procedures. (2) Determine Canadian plastic surgery residents' level of involvement while performing aesthetic procedures as they progress through their training. (3) Identify level of self-reported competence

Canadian plastic surgery residents have with different aesthetic procedures by the time they graduate.

#### 41 - Not All Breast Implants Are Equal: A 13-Year Review of Implant Longevity and Reasons for Explantation

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**Purpose:** Augmentation mammoplasty is the most common aesthetic procedure. Textured implants control implant position and have improved capsular contracture rates; however, the impact of texturing on longevity and clinical findings at explantation is unclear. Here, we examine specifics regarding explanted saline, smooth gel, Biocell, and other textured implant types, focusing on implant longevity, reasons for explantation, and intraoperative findings. **Methods:** Retrospective data were collected on all explantation cases between January 2005 and April 2017 from an aesthetic practice. Patient demographics, implant characteristics, time to explantation, and clinical presentation and intraoperative findings at explantation were analyzed with appropriate statistical tests. **Results:** Five hundred thirty-nine breast implants were explanted during the study period: 249 saline, 147 smooth gel, 123 Biocell, and 20 other nonaggressively textured breast implants. Average time from placement to explantation was 7.5 years, 5.6 years, 4.9 years, and 4.0 years for saline, other textured, smooth gel, and Biocell implants, respectively ( $P$  value =  $3.25e^{-08}$ ). The percentage of implants removed associated with implant performance failure was 50.3%, 57.5%, 75.0%, and 85.4% for smooth gel, saline, other textured, and Biocell implants, respectively ( $P$  value =  $7.25e^{-09}$ ). A total of 21.1% of Biocell implants versus 1.5% of all other implants presented with pain ( $P$  value =  $2.71e^{-15}$ ). Forty-five Biocell implants had double capsules; this phenomenon was not observed with any other implant type ( $P$  value =  $5.85e^{-37}$ ). Seven Biocell implants had late seromas, compared to 3 late seromas with any other implant type ( $P$  value = .0013). **Conclusion:** Biocell implants have the shortest time to explantation and the highest proportion of implants associated with implant performance failure when compared to saline, smooth gel, and nonaggressively textured implants. **Learning Objectives:** Participants will be able to (1) counsel their patients as to the expected longevity of different breast implant types and (2) describe risks associated with Biocell implants in comparison with saline, smooth gel, and nonaggressively textured implants.

#### 42 - The Effect of Written Information During the Informed Consent Process for Cleft Palate Repair: A Randomized Controlled Trial

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**Purpose:** Informed consent is a key component and legal requirement during the surgical consultation process. Despite a physician's best efforts, it has been shown that patients and parents do not retain and/or understand the full extent of the surgical risks that were discussed during the informed consent process. The objective of this study was to determine whether providing a written document in addition to the standard oral discussion of surgical risks improves risk recall for the parents/guardians of a child seen in consultation for cleft palate surgery. **Methods:** This was a prospective single-blinded randomized controlled trial of 40 participants. All participants were given the standard oral informed consent discussion outlining the 9 risks and complications of surgery, while participants in the intervention group received an additional written document outlining the same information. Participants were contacted 3 weeks after the initial discussion to assess their recall of the surgical risks. **Results:** Twenty participants received only the standard oral discussion, while 20 participants were randomized into the pamphlet (intervention) group. Mean age of each group was  $33.80 \pm 8.88$  and  $35.6 \pm 8.08$ , respectively. While participants given a pamphlet would be expected, on average, to have their recall score increase by 12% (IDR: 1.12; 95% CI: 0.82-1.53), there was no statistically significant difference between groups ( $P = .47$ ). Participant gender, level of education, and income were similar between groups and did not affect recall. **Conclusion:** Providing a written document to supplement the informed consent process does not significantly improve memory of surgical risks. Other methods of improving the informed consent process should be explored. **Learning Objectives:** (1) Participants will appreciate the risk recall study methodology of evaluating the informed consent process. (2) Participants will explore factors that influence the surgical informed consent process.

#### 43 - Alar Cartilage Stiffness Following Surgical Manipulation

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**Purpose:** The purpose of the study was to demonstrate the effect of cephalic trimming, cephalic turn-in flaps, and lateral crural strut grafting on lateral crural stiffness with the goal of minimizing the risk of external nasal valve collapse. **Methods:** Cyclic compression loading was performed on a total of 8 lateral crura from 4 fresh frozen cadaver specimens. The following interventions were performed: mucosal stripping, cephalic turn-in flap, cephalic trimming, and lateral crural strut grafting. Testing was performed after each intervention. Linear regression of force-displacement data was used to determine stiffness values for each surgical maneuver. Each intervention was compared to the intact cartilage. **Results:** All surgical maneuvers were tested for 7 lateral crura. All ala demonstrated a linear response to compressive loading. Intact cartilage had a mean stiffness of 3.53 N/mm. Mucosal stripping and cephalic

turn-in flaps yielded similar stiffness values to intact cartilage. Cephalic trimming reduced stiffness in all cases by a mean of 2.44 N/mm ( $P < .01$ ). Lateral crural strut grafting significantly increased stiffness by a mean of 3.67 N/mm ( $P < .01$ ). **Conclusions:** Cephalic trimming leads to decreased lateral crural stiffness in cadaveric specimens; for the first time, this has been shown in the literature. Lateral crural strut grafting increases overall stiffness of the cartilage. Cephalic turn-in flaps did not show significant difference from the control. These results should be considered in patients undergoing rhinoplasty, particularly in those at risk for external nasal valve collapse. **Learning Objectives:** (1) At the end of this presentation, the learner will understand the mechanical effect of surgical manipulation of the lower lateral cartilages in rhinoplasty. (2) At the end of this presentation, the learner will identify surgical maneuvers to reduce the risk of external nasal valve collapse.

#### 44 - Repair of Calvarial Defects Using Synthetic Onlay-Induced Bone Growth

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**Purpose:** Reconstruction of craniofacial skeletal defects represents a significant biomedical burden. This study investigates the use of a 3-D printed calcium phosphate bioceramic to induce and augment bone growth elsewhere on the skull, which can then be excised and transplanted into a skull defect. **Methods:** Twenty adult male Wistar rats were divided into 4 groups. In the transplant-onlay (TO) group, the monetite implant was fixed to the skull for 8 weeks. It was then excised and transplanted into a defect, which was left to heal for 8 weeks. In the direct placement (DP) group, the implant was placed directly into a defect for 8 weeks. The remaining 2 groups consisted of negative and positive controls, respectively, using animals with empty untreated critical-sized defects, and animals with skull defects treated with calvarial autografts. New bone growth was assessed with micro-CT and histology. **Results:** Direct placement implants and transplanted onlays showed comparable bone-implant interfaces by micro-CT imaging. However, histological analysis showed significantly superior bone formation in the transplanted onlays with clear bone bridging between the dura and the implant. **Conclusion:** Our data show that we can successfully induce bone growth into a nanoporous synthetic 3-D printed onlay. This excess bone can be excised, fashioned as needed, and used as a “customized” autologous transplant to treat critical-sized skull defects. **Learning Objectives:** (1) The importance of finding a practical alternative for autologous bone grafts in the treatment of skull defects. (2) The concept of bone growth induction and how the use of calcium phosphate onlay grafting can induce growth of new bone that can be used to repair skull defects.

#### 45 - Comparative Analysis of the Accuracy of Orbital Cavity Reconstruction

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**Purpose:** To determine whether custom patient-specific implants can restore orbital dimensions and configuration more accurately than manually shaped implants. **Methods:** A cadaveric fracture model was employed using 3 fresh frozen heads (6 orbits). CT scans were performed to obtain baseline anatomy before and after the creation of 6 pure inferomedial orbital cavity defects. Custom orbit-specific implants were fabricated. Four experimental groups were analyzed (1) manually shaped/manually placed composite implants, (2) custom shaped/manually placed composite implants, (3) custom shaped/custom indexed composite implants, and (4) custom shaped/custom indexed titanium implants. Custom indexing controlled the position of the orbital implant. CT scans were repeated following placement of each implant by surgeons blinded to the initial fracture creation. Data analysis (Amira 5.4, FEI) was performed to evaluate the accuracy of orbital reconstruction in terms of implant placement (in-place distance) and implant shape (implant shape distance). The in-place distance and in-shape distance were calculated using the root mean square distance (mm). A comparison among the different groups was performed using ANOVA ( $P < .05$ ). **Results:** In terms of shape, no significant difference was noted among the groups, indicating that shape conformance to orbital topography was good irrespective of implant type ( $P = .41$ ). However, a significant difference was noted when comparing implant position among the groups ( $P = .005$ ), indicating that implant indexing improves overall restoration of orbital anatomy. **Conclusions:** Patient custom shaped implants show no advantages in terms of shape in comparison with manually shaped implants. However, indexing of custom implants improves overall implant placement when restoring pre-injury orbital anatomy, indicating that the placement of implant is where surgical error occurs. **Learning objectives:** (1) Participants will appreciate challenges of accurate restoration of orbital dimensions and shape. (2) Participants will gain knowledge of computer-generated implant solutions for orbital reconstruction.

#### 46 - The Chevron Flap—A Case Series Demonstrating a Novel Flap Design and Applications

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**Purpose:** Soft tissue reconstruction for traumatic or iatrogenic defects typically progresses along a reconstructive ladder with successively more advanced reconstructive techniques used for more complex wounds. Skin cancer excision commonly creates

small- to medium-sized defects that require closure. The chevron flap is a novel bipedicle V-Y random pattern advancement flap with many advantages over primary closure, skin grafting, and other local flaps for soft tissue reconstruction commonly encountered with cancer excisions. **Methods:** This case series of 24 chevron flaps in 21 patients reviews the practical design, use, and applications of the flap, while highlighting certain important considerations. **Results:** Defects varying in size from 15 to 89 cm<sup>2</sup> were reconstructed in 16 males and 5 females ranging in age from 15 to 89. In all 24 cases, there were 2 minor complications of superficial dehiscence, 1 case of superficial infection treated with antibiotics, and no major complications such as partial or complete flap loss. **Conclusions:** The chevron flap is a versatile and reliable flap with applications almost anywhere on the body. These local flaps present numerous advantages over primary closure and skin grafting including reduced tension, improved aesthetic outcome, avoiding resection of healthy dog ear tissue, simpler equipment requirements, shorter hospital stays, simpler wound care, reduced need for splinting, and no distant donor site defect. The chevron flap further improves vascularity compared to the keystone and crown flaps because it eliminates the need to incise the flap circumferentially, thereby preserving dermal blood flow in the skin bridges bilaterally. **Learning Objectives:** (1) To describe the design and applications of the novel chevron local flap. (2) To review the indications and advantages of various skin cancer defect reconstruction techniques. (3) To review the advantages of the novel chevron flap compared to its predecessors including the keystone and crown flaps.

#### 47 - Surgical Outcomes of VRAM Versus Gracilis Flaps in Immediate Pelvic and Perineal Reconstruction

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<sup>1</sup>Ottawa, Ontario, Canada

**Purpose:** The reconstruction of complex pelvic and perineal defects following surgical exenteration and radiation is associated with significant surgical site morbidity. Rates of acute and serious complications occur in up to 60% and 46% of patients, respectively. Myocutaneous flap reconstruction with a VRAM has been the gold standard, associated with reduced perineal morbidity compared to primary closure alone. The purpose of the present study was to compare postoperative outcomes and healing of VRAM and gracilis-based perineal reconstructions. **Methods:** This study retrospectively reviewed immediate pelvic and perineal reconstructions using VRAM and gracilis flaps from 2012 to 2017. Electronic medical records were analyzed for patient demographics, intraoperative data, and postoperative outcomes, including morbidity, mortality, and healing time. **Results:** Forty-eight patients underwent immediate perineal reconstruction post pelvic exenteration for locally

advanced disease, 32 (67%) with VRAM and 16 (33%) with gracilis. Preoperative radiation was administered in 88% of gracilis and 78% of VRAM reconstructions. Overall, there was no significant differences in minor complication rate (31% vs 34%;  $P = .8$ ), major complication rate (13% vs 9%;  $P = 1.0$ ), and 30-day mortality (0% vs 0%;  $P = 1.0$ ). Abdominal wall complications were not increased in the VRAM group, despite flap harvest from the abdominal wall. The mean and median time to complete wound healing was significantly reduced with gracilis reconstruction compared to VRAM, 47 versus 139 days,  $P = .009$ , and 48 versus 69 days,  $P = .02$ , respectively. **Conclusions:** The workhorse flap in pelvic and perineal reconstruction is still the VRAM flap, however, at times it is not available for harvest. The present study demonstrates similar complication rates between VRAM and gracilis-based perineal reconstruction, with rates comparable to previous literature. However, gracilis reconstruction was associated with a significantly reduced healing time (mean of 92 days shorter) compared to VRAM-based reconstruction. **Learning Objectives:** Participants will be able to appreciate the rationale for using myocutaneous flaps in the reconstruction of complex perineal defects following pelvic exenteration surgery.

#### 48 - Corneal Neurotization Prevents Corneal Ulceration and Preserves Vision in a Rat Model of Neurotrophic Keratopathy

J. Catapano<sup>1,\*</sup>, K. Antonyshyn<sup>1</sup>, and G. Borschel<sup>1</sup>

<sup>1</sup>Toronto, Ontario, Canada

**Purpose:** Trophic mediators derived from corneal nerves are necessary to maintain corneal epithelial integrity and clarity. Patients with absent corneal sensation develop neurotrophic keratopathy (NK), a degenerative disease characterized by corneal ulceration, scarring, and vision loss. In clinical studies, surgical reinnervation with corneal neurotization restores corneal sensation but it is uncertain whether donor nerves prevent corneal ulceration and scarring in NK. We investigated whether corneal neurotization prevents epithelial breakdown and scarring in a rat model of NK. **Method:** A rat model of NK was used where the left corneal innervation is ablated with intracranial stereotactic electrocautery; rats were randomized to receive either no treatment or treatment with corneal neurotization (1:2 ratio). Four weeks after stereotactic electrocautery, the protective tarsorrhaphy was removed. The left cornea was assessed daily for 7 days with standardized photographs under light and with a Wood lamp/fluorescein staining to assess corneal scarring and epithelial breakdown. Data were analyzed using Fisher exact test or student  $t$  test where appropriate. **Results:** All rats with corneal nerve ablation not treated with corneal neurotization ( $n = 5$ ) developed advanced NK, including significant breakdown of the corneal epithelium with corneal perforation in 80%. In rats treated with corneal neurotization ( $n = 10$ ), fewer rats developed epithelial breakdown (20%;  $P = .007$ ) and no rat developed a perforation ( $P = .003$ ).

After 7 days, rats with corneal neurotization demonstrated significantly less ulceration of the corneal surface area in comparison with rats without treatment ( $0.0 \pm 0.0$  vs  $30.1\% \pm 12.7\%$ ,  $P < .0001$ ). Corneal neurotization reduced corneal scarring.

**Conclusion:** Corneal neurotization reduces corneal epithelial breakdown and scarring in rats with NK, suggesting that donor nerves after corneal neurotization restore nerve-derived trophic mediators necessary to prevent vision loss in patients with NK.

**Learning Objectives:** (1) Understand how animal models complement clinical research. (2) The impact of corneal neurotization on the corneal epithelium and vision.

## 48GL - CSPS GUEST SPEAKER

### Artificial Intelligence

R. Schaeffer<sup>1</sup>

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Applications of artificial intelligence (AI) technology have been deployed for many decades, but until recently have largely been invisible in the market. There have been major advances in the field recently that have resulted in public-facing applications of the technology (such as driverless cars). Artificial intelligence will revolutionize society; the only question is how fast will be the transformation.

This talk will give a gentle introduction to AI and how computers “think” differently than humans. It will be illustrated using games to explain the fundamental differences and then use medical-related applications to show the potential for AI will transform patient diagnosis and treatment.

### Learning Objectives

1. Participants will be able to understand the strengths and weaknesses of computational models of “intelligence.”
2. Participants will be able to describe examples that show how computer methods are fundamentally different than human methods for problem-solving.
3. Participants will learn about several medical-related examples that illustrate how artificial intelligence can transform patient diagnosis and treatment.

## 48PI - Panel #1

### Facelift

Moderator: R. Warren (Vancouver);

Panelists: B. Peterson (Kelowna), W. Perron (Calgary), S. Pritchard (Toronto)

### Learning Objectives

After the facelift panel, attendees will be better able to:

- (1) Assess the needs of patients presenting for facial rejuvenation surgery

- (2) Plan a suitable facelift procedure for the individual patient
- (3) Perform an effective facelift procedure with a high margin of safety

## 48P2 - Panel #2: Enhanced Recovery After Surgery (ERAS)

### ERAS Guidelines, PRO data, Alberta Experience

Moderator: C. Temple-Oberle (Calgary, Alberta, Canada)

Panelists:

Experience in an American Centre, regional blocks, patient information?

M. Saint-Cyr (Rochester, MN, USA)

Experience in Ontario: Virtual and Smartphone Assisted Follow-up?

J. Semple (Toronto, Ontario, Canada)

Alloplastic and implant-based breast reconstruction are challenging to recover from. Additionally, women often need several surgeries, multiplying a potentially poor recovery experience several fold. Eighteen recommendations for enhanced recovery after surgery have been made to improve recovery and patient experience, while decreasing complications, cost, and care time. This panel will explore practical ways to facilitate a safe and satisfying recovery for your patients undergoing breast reconstruction.

### Learning Objectives

- (1) To analyze the recommendations on ERAS for breast reconstruction.
- (2) To critique the experiences of various centers with ERAS guidelines.
- (3) To appreciate the patient experience with smart phone technology for outpatient support.
- (4) To consider administrative challenges in established ERAS protocols.

## 48P3 - Panel #3

### Revision Aesthetic Breast Surgery

Moderator: P. Lennox (Vancouver)

Panelists: M. Mosher (Langley), N. Carr (Vancouver), B. Peterson (Kelowna)

Revision surgery for cosmetic breast patients is becoming more common. This is often difficult and complicated surgery, requiring more complex techniques and time than primary surgery. Patients report that it is often difficult to find surgeons willing to take on complicated revision cases. This panel will

utilize expert opinion to focus on techniques to avoid revisions, as well as specific techniques used in revision surgery. There will also be a discussion surrounding the management of these patients, including planning and costs associated with complex cases.

## Learning Objectives

1. Review of procedures that increase risk of need for revision surgery and how to avoid these.
2. Review of specific techniques in revision aesthetic breast surgery and when and how to utilize these.
3. Review of the overall management of these patients, including whether and when to incorporate revision breast surgery into your practice, as well as the costs associated with operating on this patient population.

## 48P4 - PANEL #4

### Secondary Reconstruction of the Burn Patient

Moderator: E. Tredget (Edmonton)

Panelists: P. Kwan (Edmonton), D. Nickerson (Calgary), A. Papp (Vancouver), I. Perreault (Montreal)

## Learning Objectives

At completion of this course, the attendee will be able to:

1. Appreciate the approach to burn scar management and reconstruction using different modalities including vascular and ablative lasers, silicone gel, and pressure garments.
2. Obtain insight into current assessment, management, and reconstruction of thermal injuries and deformities in the pediatric population.
3. Learn an approach to assessment and surgical management of a variety of facial deformities after burn injury.
4. Understand the current status of skin coverage techniques and tissue engineering for wound coverage of thermal burn injuries.

## 49 - Electrical Stimulation as an Adjunct to the Oberlin Nerve Transfer

M. Morhart<sup>1,\*</sup>, J. Olson<sup>1</sup>, and M. Chan<sup>1</sup>

<sup>1</sup>Edmonton, Alberta, Canada

**Purpose:** Our study was designed to test our hypothesis that postoperative electrical stimulation for 1 hour was superior to performing the Oberlin nerve transfer (ulnar nerve fascicular transfer to musculocutaneous nerve) only. **Methods:** We designed a randomized, double-blinded study comprising 2

groups of patients diagnosed with significant upper trunk brachial plexus injuries presenting at our multidisciplinary Brachial Plexus Clinic. Specifically, patients undergoing the Oberlin transfer for restoration of elbow flexion were studied. Each group comprised 9 patients: group 1 consisted of patients undergoing the nerve transfer alone (sham electrical stimulation). Group 2 consisted of patients undergoing both the nerve transfer and 1-hour postoperative electrical stimulation. Postoperative assessments included MRC grading, quantitative force measurements, and the DASH questionnaire. Statistical analysis was performed using SPSS. **Results:** A total of 18 patients were studied for an average of 2.8 years. The mechanism of injury was a result of MVCs in 54% of the patient cohort. The average time from injury to surgery was 7 months. The average age of the patients was 39 years (18-67) and included 16 males and 2 females. Preoperative assessments for MRC grading, force measurements, and DASH were similar between the 2 groups. While there was a trend to higher MRC grading postoperatively in the E-stimulation group compared to sham, there was a statistically significant improvement in the force measurement and the DASH scores ( $P < .05$ ). **Conclusion:** Oberlin transfer is an effective and predictable procedure for restoration of elbow flexion in patients with upper trunk brachial plexus injuries. This is the first study in human trials demonstrating that electrical stimulation for 1 hour postoperatively provided a statistically significant improvement in both quantitative force measurements and the DASH when compared to the transfer alone. **Learning Objectives:** (1) To familiarize the treatment options for the restoration of elbow flexion. (2) To appreciate that electrical stimulation in the clinical setting is an effective simple, safe, and well-tolerated adjunct for the treatment of nerve injuries.

## 50 - Reporting Outcomes and Outcome Measures in Cubital Tunnel Syndrome: A Systematic Review

L. Gallo<sup>1,\*</sup>, M. Gallo<sup>1</sup>, J. Murphy<sup>1</sup>, D. Waltho<sup>1</sup>, C. Baxter<sup>1</sup>, and A. Thoma<sup>1</sup>

<sup>1</sup>Hamilton, Ontario, Canada

**Purpose:** To identify all outcomes and outcome measures used to evaluate postoperative results for cubital tunnel syndrome. The ultimate intention is to develop a short list of critical outcomes that should be used by future investigators in clinical research related to ulnar nerve decompressions at the level of the elbow. This will allow pooling of the evidence in future meta-analysis. **Methods:** Extensive computerized database searches of MEDLINE and EMBASE were performed. All trials involving  $n = 20$  patients, aged 18 and older undergoing any surgical intervention for idiopathic ulnar neuropathy at the elbow were included. All outcomes and outcome measures used in these studies were extracted and tabulated. **Results:** This systematic review identified 101 studies which satisfied the stated inclusion criteria. Forty-six unique outcomes were



identified. Thirty-one postoperative outcome measures were recorded consisting of 7 condition-specific, author-reported instruments; 4 condition-specific, patient-reported instruments; 8 patient-reported, generic instruments; 11 author-generated instruments; and 1 utility measure. The Patient-Rated Ulnar Nerve Evaluation (PRUNE) was the only instrument to demonstrate adequate validity, reliability, and responsiveness to change in patients with ulnar nerve compression at the elbow. **Conclusion:** There is marked heterogeneity in the outcomes and outcome measures used to assess cubital tunnel syndrome. A standardized core outcome set is urgently needed to make it possible for future investigators to compare the results of various techniques of cubital tunnel decompressions. More importantly, such standardization will permit pooling of results from smaller studies in a meta-analysis which can inform decisions. The PRUNE condition-specific outcome measure is the only one identified that has the psychometric properties of reliability, validity, and responsiveness to change that can be used in cubital tunnel decompressions. **Learning Objectives:** Participants will be able to understand the role core outcome sets and its benefits in clinical research.

## 51 - Outcomes of the Adams-Berger Ligament Reconstruction for the Distal Radioulnar Joint Instability in 95 Consecutive Cases

J. Gillis<sup>1,\*</sup>, J. Khouri<sup>1</sup>, E. Soreide<sup>1</sup>, R. Berger<sup>1</sup>, and S. Moran<sup>1</sup>

<sup>1</sup>Rochester, Minnesota

**Purpose:** To evaluate the outcomes and complication rate for Adams-Berger anatomic reconstruction of the distal radioulnar joint (DRUJ). **Methods:** We conducted a retrospective chart review to evaluate adult patients who had undergone reconstruction of the DRUJ for instability with the Adams-Berger procedure between 1998 and 2015 within our institution. Charts were reviewed for patient demographics, mechanism of injury, pre-surgical physical findings, surgical related data, and follow-up data. **Results:** Ninety-five wrists in 93 patients were included. Mean (SD) age at surgery was 37.3 years (12.7 years) and follow-up time was 65.8 months (63.2 months). At the last follow-up, 90.8% of patients had a stable DRUJ, 5.3% did not, and 3.4% had some laxity. At last clinical follow-up, 27.5% and 48.4% of patients described either no pain or mild pain, respectively. Overall, graft survival was 87.4%, with 12 patients undergoing revision surgery with a mean time of revision from primary reconstructive surgery of 13.3 months. Grip strength increased with a decrease in pronosupination ( $P < .05$ ). There was inferior graft survival in females compared to males ( $P = .041$ ) and with the use of an interference screw ( $P < .005$ ). Age, timing of surgery, type of graft (auto- and allograft), type of graft fixation, sigmoid notch anatomy, involvement of dominant wrist, or previous surgery to the wrist did not affect the revision rate. **Conclusion:** Our findings

demonstrate that Adams-Berger anatomic ligament reconstruction of the DRUJ provides reliable long-term results with an overall graft survival of 87% at >5-year follow-up. **Learning Objectives:** (1) To understand the risk factors for revision of the Adams-Berger procedure. (2) To appreciate the long-term outcomes of anatomical reconstruction of the DRUJ.

## 52 - Electrophysiologic Outcomes of AIN End-to-Side Transfer for Severe Cubital Tunnel Syndrome: Preliminary Results

M. Curran<sup>1,\*</sup>, A. Hachisuka<sup>1</sup>, M. Morhart<sup>1</sup>, J. Olson<sup>1</sup>, and M. Chan<sup>1</sup>

<sup>1</sup>Edmonton, Alberta, Canada

**Introduction:** Cubital tunnel syndrome is the second most common compression neuropathy. In severe cases, functional outcomes can be poor despite surgical decompression. This is partly due to the distance between the site of injury and the target hand muscles. To circumvent that challenge, an end-to-side (ETS) nerve transfer to the ulnar nerve using a branch of the anterior interosseous nerve has gained increasing popularity. However, whether the donor motor axons are able to grow to the target muscles is unknown. The purpose of this study was to determine the relative contributions of the AIN and the ulnar nerve to the motor recovery. **Methods:** A prospective series of cubital tunnel patients with severe axonal loss, decompression of ulnar nerve at the cubital tunnel, and an end-to-side transfer AIN to the ulnar nerve was completed. To evaluate the contributions of the AIN and the ulnar nerve to the hypothenar muscle, electrophysiology including motor unit number estimation (MUNE) was completed preoperatively and at 3, 6, and 12 months following surgery. The results were analyzed using nonparametric statistics. **Results:** Ten patients were enrolled, 7 had a minimum of 6 months follow-up with a median period of 8 (IQR: 6-12). Patients were all male with a median age of 69 (57-74). There was no evidence of axonal growth from the AIN to the hypothenar muscles in any of the patients. MUNE at the last follow-up (11 [6-11]) remained unchanged from baseline (12 [7-22];  $P = .61$ ). **Conclusion:** There was no electrophysiologic evidence of axons crossing from the AIN following an end-to-side transfer, with all motor axons in the hypothenar originating from the ulnar nerve. **Learning Objectives:** (1) There is no electrophysiologic evidence of cross over from AIN into the ulnar nerve. (2) All motor units in the hypothenar come from the ulnar nerve.

## 53 - Markov Decision-Analytic Model of the Cost-Utility of Composite Tissue Allotransplantation, Myoelectric Prosthetics, and Body-Powered Prosthetics in Bilateral Transradial Amputation

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**Introduction:** Canadian bilateral upper limb amputees (BUL) have access to body powered prosthetics (BPP). Two emerging technologies with potential for improved function are myoelectric prosthetics (MEP) and composite tissue allotransplantation (CTA). Myoelectric prosthetics has an increasing presence in Canada and there is 1 case of CTA. The purpose of this study is to evaluate the cost-effectiveness of these 3 strategies. **Methods:** A Markov model evaluated the 3 treatment strategies: (1) bilateral BPP, (2) bilateral MEP, or (3) bilateral CTA. Both quality-adjusted life years (QALY) and costs were modeled over a lifetime horizon. Utilities, probabilities, and costs were identified through a targeted literature search, local case costing, or expert opinion. Model validity was tested, base case incremental cost-effectiveness ratios (ICERs) were calculated, 1- and 2-way analyses, and probabilistic sensitivity analyses were conducted. **Results:** Over a lifetime horizon, BPP was preferred, resulting in 14.45 ALYs at a cost of \$281 795. Relative to BPP, MEP and CTA had ICERs above the standard willingness-to-pay threshold (\$50 000/QALY) at \$75 895/QALY and \$780 061/QALY, respectively. Composite tissue allotransplantation was neither favored nor cost-effective in 1-way sensitivity analysis. The model was sensitive to the costs and utilities of MEP and BPP on both 1- and 2-way analyses. When MEP device cost is <\$31 000, MEP is the preferred strategy over BPP, and when <\$25 000, BPP is not cost-effective and removed from the model. PSA demonstrated that BPP and MEP met the willingness-to-pay threshold (\$50 000/QALY) 57.5% and 42.3%, respectively. **Conclusions:** This decision analytic model identified BPP as the preferred strategy. Myoelectric prosthetics can be cost-effective with less expensive devices and with improved effectiveness, which is expected as the technology advances in the future. The current risks and associated cost of immunosuppression for CTA do not result in a cost-effective strategy. **Learning Objectives:** To review cost-effectiveness of strategies to improve function among BUL amputees.

## 54 - Adding Physiatrists to the Calgary Hand Clinic: An Effective Way to Manage Nonoperative Pathologies

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**Purpose:** To investigate the impact of a Multidisciplinary Hand Clinic (MHC) at the Peter Lougheed Centre (PLC) in Calgary, Alberta. **Methods:** Data were extracted from the millennium database for all new referrals between January 2017 and January 2018. Since the introduction of the MHC in August 2017, referrals were triaged by a plastic surgeon directly to plastic surgery (PS), physiatry (PM&R), physiotherapy (PT), or minor surgery. Patients triaged to PS were further assigned a score of PS1, PS2, or PS3 based on urgency, where PS1 was most urgent. Patient demographics, wait times, and volume of referrals by triage category before and after the introduction of

the MHC were analyzed. **Results:** A total of 1458 new patients were seen in 2017. Mean age was 51.0 years and 49% were female. Before the introduction of physiatrists, 591 (90%) patients were referred to directly to PS, 28 (4%) to PT, and 43 (6%) to minor surgery (n = 728). Of the 591 PS referrals, 397 (67%) were PS1, 158 (27%) PS2, and 36 (6%) PS3. After the introduction of physiatrists, 451 (62%) of patients were referred directly to PS, 173 (24%) to PM&R, 17 (2%) to PT, and 31 (6%) to minor surgery (n = 730). Of the 451 PS referrals after the introduction of the MHC, 334 (74%) were PS1, 88 (20%) PS2, and 29 (6%) PS3. Number of patients awaiting assessment dropped from 2176 to 1961 after introduction of physiatrists. **Conclusions:** Since the introduction of the MHC, plastic surgeons are able to see a higher volume of urgent and operative consults, with many nonoperative cases offloaded directly to physiatry or physiotherapy. **Learning Objectives:** To list the potential benefits of a MHC.

## 55 - Direct Pectoralis Major Tendon Transfer for Elbow Flexion: A Novel Surgical Technique and Outcomes

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**Purpose:** Previously described techniques of bipolar pectoralis major flap to restore elbow flexion in brachial plexus injuries carry significant surgical morbidity with limited functional improvements. This study describes the surgical technique of direct pectoralis major tendon transfer for elbow flexion and reviews its clinical outcomes. **Methods:** A retrospective review of patients treated with direct pectoralis major tendon transfer for reconstruction of elbow flexion following brachial plexus injury and minimum 1-year follow-up was performed. Surgical technique involved harvest of the entire pectoralis major humeral tendinous insertion with a bone block elongated with autograft or allograft tendon and secured to the proximal radius. Outcomes include preoperative and postoperative British Medical Research Council score, range of motion (ROM), and complications. **Results:** Twelve patients with mean age of 29 years (range, 10-40) underwent direct pectoralis major transfer for elbow flexion. There were 9 primary reconstructions and 3 revisions that had previously failed multiple reconstructive attempts. All patients sustained traumatic brachial plexus injuries at a mean of 9 years (range, 3-17) prior to surgery. Preoperatively, 2 patients had M1 and M2 elbow flexion, and the remainder had M0. Preoperative sternal head pectoralis major strength was graded M4 in 5 and M5 in 7 patients. Postoperatively, 8 patients achieved ≥M4 elbow flexion, 3 regained M3 function, and 1 achieved M2 function only. Mean postoperative active elbow ROM was 35° extension (range, 10-80) and 110° flexion (range, 90-125). Complications included revision graft tensioning in 1 patient that ultimately achieved M3 elbow flexion. **Conclusion:** Direct pectoralis major tendon transfer for elbow flexion is a novel surgical technique with

limited morbidity. The transfer reliably restores  $\geq$ M3 elbow flexion following brachial plexus injury even in the revision setting. **Learning Objectives:** Participants will learn the indications, surgical technique, and clinical outcomes of direct pectoralis major tendon transfer for elbow flexion.

## 56 - Side-to-Side Nerve Grafts Enhance Sensory Recovery in Ulnar Neuropathy

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**Purpose:** Intrinsic atrophy and debilitating sensory loss are prominent features of severe ulnar neuropathy with limited surgical options to reliably improve recovery. Restoration of sensation is important to provide protection for the vulnerable ulnar border of the hand. In this study, we report our experience with side-to-side sensory nerve grafting (cross-cross grafting) to enhance ulnar sensory recovery. **Methods:** A retrospective chart review was performed to identify patients with severe ulnar neuropathy who underwent cross-cross nerve grafting to enhance sensation. Patients were included if they had loss of protective sensation with 2-point discrimination  $>8$  mm, Semmes-Weinstein monofilament testing (SWMT)  $>4.56$ , and/or no response on sensory nerve conduction study. Side-to-side nerve grafts were coapted from the third webspace component of the median nerve to the sensory component of the ulnar nerve in the palm, employing short-segment allograft or autograft. A minimum 1-year follow-up was required. Analysis included assessment of demographics, electrodiagnostics, objective sensory testing, and DASH disability score. **Results:** Forty-eight patients underwent cross-cross grafting between 2014 and 2017. Average age was 51.8 years and 33% were female. Twenty patients had cubital tunnel syndrome, 7 had brachial plexus injury, 4 had ulnar nerve laceration, and 2 had cervical radiculopathy. Twenty-four patients had adequate follow-up for inclusion. Allograft was used in 21 patients and autograft in 3 patients. By 1 year postoperatively, 87% (21/24) had return of protective sensation by SWMT. There were no complications or median sensory deficits. DASH disability scores improved significantly (60.1 vs 30.0,  $P < .05$ ). **Conclusion:** Cross-cross nerve grafting is a useful adjunct to enhance sensory recovery in patients with severe ulnar neuropathy. The technique is safe and simple to perform. **Learning Objective:** Acquire knowledge of a novel technique to enhance sensory recovery in severe ulnar neuropathy.

## 56CE - Canadian Expert Series

### Pitfalls of Primary Facial Trauma Repair

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Primary facial fracture repair aims to reconstruct a stable, anatomically accurate facial skeletal framework and to restore facial soft tissue morphology, while maintaining function of all associated structures. Current surgical approaches and techniques have evolved to allow attainment of these objectives. Failure to adhere to these principles can result in significant secondary deformity.

The major pitfall of primary facial trauma repair is the failure to restore a stable anatomically accurate facial skeleton. This invariably results in fracture malunion. Specific causes are

1. Failure to recognize an unstable fracture pattern.
2. Failure to achieve anatomical reduction.
3. Failure to provide adequate stabilization.

Secondary soft tissue deformities are predominantly iatrogenic. The primary causative factors are

1. Errors in incision placement and exposure.
2. Failure to resuspend soft tissues.
3. Underlying skeletal deformity/malunion.

Specific measures that can be taken to avoid these pitfalls will be illustrated.

## Learning Objectives

At the end of this lecture, the learner will be able to

1. Identify the 3 causes of fracture malunion and recognize how to avoid them.
2. Describe the iatrogenic causes of soft tissue deformity following primary fracture repair.
3. Modify soft tissue management in facial fracture exposure to minimize iatrogenic deformity.

## 57 - Outcomes Following Nerve Transfer for Restoration of Shoulder Function in Adults

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**Purpose:** To examine the functional outcomes of patients who have had nerve transfers for restoration of shoulder function. **Methods:** Retrospective chart review of patients undergoing nerve transfer to restore the axillary and/or suprascapular nerve between 2004 and 2016. Patients over 16 years of age had normal preoperative donor EMG and minimum 1-year follow-up. Motor functional outcomes were measured using EMG and nerve conduction studies, MRC grade, and force platform strength. Patient-reported outcomes were done using the DASH questionnaire. **Results:** Thirty-five patients enrolled and 5 were lost to follow-up. Average follow-up length was 33 months for axillary nerve and 34 months for SSN. For all axillary nerve reconstruction, 73% achieved M3 or greater

strength and 64% achieved M4 or greater strength. Isolating the pure axillary nerve injuries, 87.5% achieved M4 or greater strength. Patients recovered 68.9% of their muscle strength compared to the uninjured side as measured on the force platform. For SSN reconstruction, 70% of patients achieved M3 or greater strength and 60% achieved M4 or greater strength. Patients recovered 44.1% external rotation strength compared to the uninjured limb on the force platform. Dash scores revealed that significant postoperative disability remained for patients requiring multiple nerve transfers as compared to those needing only single nerve transfers ( $48.2 \pm 24.1$  compared to  $16.7 \pm 4.4$ ). **Conclusion:** Isolated nerve injuries requiring single transfers recover better than patients requiring multiple nerve transfers. First study showing muscle strength recovery objectively with force platforms. Our study demonstrates better recovery of axillary nerve and SSN function than reported in the literature. **Learning Objectives:** (1) To understand the functional outcomes of nerve transfer for restoration of shoulder function. (2) To use objective measures to understand the extent of recovery patients can achieve.

## 58 - Primary Shoulder Surgery as a Possible Complete Treatment for Obstetrical Brachial Plexus Palsy

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**Purpose:** Indications for primary nerve surgery in the treatment of obstetrical brachial plexus palsy (OBPP) vary and continue to evolve. Imbalance of shoulder musculature resulting from OBPP can lead to glenohumeral subluxation and glenoid dysplasia within the first year of life. Resulting dysmorphology can alter mechanics of motion throughout the arm sufficiently to obscure functional neuromuscular recovery of the upper extremity. We evaluated the ability of early primary shoulder surgery—musculoskeletal surgery about the shoulder prior to 1 year of age and prior to any nerve surgery—to obviate the need for primary nerve reconstruction in select patients with OBPP. **Method:** All patients presenting with OBPP between 2015 and 2017 who underwent primary shoulder surgery in the first year of life were included. Preoperative and postoperative Active Movement Scale (AMS) scores, cookie test outcomes, and need for subsequent nerve surgery were assessed. **Results:** Eight patients met inclusion criteria. All underwent subscapularis release and tendon transfers of teres major and latissimus dorsi to reposition the glenohumeral joint. Preoperatively, no patients passed the cookie test and average AMS scores for shoulder external rotation and elbow flexion were 1.5 and 4.0, respectively. Postoperatively, average AMS scores improved to 3.25 and 6; 7 patients passed the cookie test

and did not require nerve reconstruction. One patient had persistent elbow flexion deficits and underwent median-to-biceps nerve transfer. **Conclusions:** Primary shoulder surgery may preclude the need for primary nerve reconstruction in select patients with early glenohumeral subluxation in the setting of OBPP. Further study will help better define the indications for and outcomes of early shoulder surgery in patients with OBPP. **Learning Objectives:** Early primary shoulder surgery may preclude the need for primary nerve surgery select patients with OBPP.

## 59 - Lower Trapezius to Triceps Tendon Transfer in Patients With Brachial Plexus Palsy: Surgical Technique and Case Series

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**Purpose:** In brachial plexus palsy cases sparing hand function, reconstructing triceps muscle function is important for hand positioning in space. When nerve reconstruction or traditional tendon transfers, such as latissimus dorsi or posterior deltoid, is not an option, lower trapezius to triceps tendon transfer is an alternative option. This study describes the surgical technique and reviews the clinical outcomes of this transfer. **Methods:** A retrospective review of patients undergoing lower trapezius to triceps transfer is performed. The surgical technique for ipsilateral lower trapezius transfer is described. Outcome measures include preoperative and postoperative British Medical Research Council score, range of motion (ROM), and complications. **Results:** Between March 2010 and August 2017, 8 male patients with a mean age of 34.9 (range, 11-72) years underwent a lower trapezius to triceps tendon transfer. All patients had at minimum a posterior cord palsy, 7 secondary to trauma, and 1 secondary to a perineurioma. Surgery was performed at a mean of 42.2 (range, 14.9-120.6) months post injury. Mean follow-up was 20.7 (range, 1.9-55.1) months. Preoperatively, 7 patients exhibited grade M0 and 1 had M1 triceps strength. All patients had preoperative M5 trapezius strength except 1 (M4). Postoperatively, all patients developed at least M3 triceps muscle strength, with 5 of 8 developing M4 or greater. Postoperative elbow mean active ROM was 10° to 105° (range, 5°-135°). Complications included a ruptured tendon transfer in 1 patient, requiring revision surgery ultimately achieving M3 triceps strength. **Conclusions:** In brachial plexus palsy cases where hand function is preserved and the spinal accessory nerve has not been used in previous reconstructions, lower trapezius to triceps tendon transfer is a viable and reliable option for reconstruction of elbow extension. **Learning Objectives:** Participants will learn the indications, contraindications, surgical technique, and clinical outcomes of lower trapezius to triceps tendon transfer.

## 60 - Pregnancy and Parenthood Remains a Challenge During Surgical Residency: A Systematic Review

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**Purpose:** To examine common themes and synthesize data surrounding pregnancy and parenthood during surgical residency. **Methods:** A literature search was conducted by 2 reviewers as per the PRISMA method. Qualitative and quantitative manuscripts met inclusion if published between 2003 and 2018, with a content focus on pregnancy, parenthood, and the experience of surgical residents and programs. Exclusion criteria were nonsurgical programs, editorials, or commentaries. Quantitative data were synthesized into ranges, whereas qualitative data were organized by theme. Bias, generalizability, and validity were recorded. **Results:** Of 306 manuscripts screened, 21 met the specified criteria for inclusion. Data synthesis indicated that female surgical residents had fewer children in residency than their male counterparts (18%-28% vs 32%-54%). As compared to the general population, they had their first child later in life (30-34 vs 25 years old) and had fewer children overall (1.4-2.1 vs 1.9-2.6). When surveyed after residency, female surgeons had fewer children than their male counterparts (68% vs 91%). Among female surgical residents, infertility and assisted reproductive technology (ART) rates were higher than the general population (infertility 30%-32% vs 11%; 8%-13% conceived using ART vs 1%-1.4%). Among pregnant surgical residents, a high rate of obstetrical complications were reported; working more than 6 call shifts a month or more than 60 hours per week were predictors of increased complication rates. There were no differences in attrition, caseload, or exam pass rates for female residents who had become pregnant. Nevertheless, negative attitudes and perceptions toward pregnancy in residency were consistently identified. **Conclusions:** Female surgical residents voluntarily delay childbirth, experience high rates of infertility, and obstetrical complications, as well as negative stigma. Formal maternity policies, as well as a shift in surgical culture, are needed to attract and retain female surgical residents. **Learning Objective:** To identify common themes surrounding pregnancy and parenthood in surgical residency.

## 61 - Academic Achievement in School-Aged Single-Suture Craniosynostosis Patients Over Time

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**Purpose:** School-aged nonsyndromic single-suture craniosynostosis (SSC) patients may be at risk for developmental

delays. However, it is unclear whether cognitive delays persist into school-age and how cognitive performance changes. Studies have not been able to adequately address this topic due to variation in age of assessment and lack of appropriate comparison and longitudinal evaluation. The objective of this study is to describe and compare the individual academic achievement level of school-aged children with nonsyndromic SSC to their peers over time. **Method:** Children with nonsyndromic SSC and who were enrolled in grade 3 or 6 in an Ontario Elementary School during the 2003/4 to 2013/4 academic years were eligible to participate. The Education Quality and Accountability Office (EQAO), a standardized provincial examination, was used to track their trajectory in reading, writing, and mathematics in grades 3 and 6. The scores were categorized as below average, average, or above average with relation to the achievement level of students in their respective school. The need for identification, placement, and review committee (IPRC) was used as an indication of need for special education. **Results:** A total of 42 patients consented to participation. The EQAO scores revealed average performance across academic subjects. There was a statistically significant decrease in reading scores and a nonsignificant change in writing and math scores over time. A total of 25 patients had IPRC data available for both grades 3 and 6. One (4%) child required IPRC in grade 3, and significantly an additional 4 (20%) required IPRC in grade 6. **Conclusions:** Children with SSC may experience increased cognitive difficulties and special education needs in grade school. Developmental delay observed in SSC patients may become more evident as these children progress through grade school. **Learning Objectives:** (1) Understand the cognitive challenges of school-aged SSC patients over time.

## 62 - The Long-Term Morphometric Outcomes in Patients With Untreated Craniosynostosis

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**Introduction:** The purpose of this study is to characterize temporal changes in cranial morphology in unrepaired craniosynostosis. **Methods:** All patients identified with craniosynostosis at the Hospital for Sick Children between 2008 and 2017 who did not undergo surgery and had at least 2 3dMD photographs were included in the study. 3-D images were analyzed using Vectra software to calculate cranial volume, cranial index (CI), and height. Images were scaled for growth and compared to normative skulls. 2D measurements of area under the curve (AUC) were calculated for each patient's frontal profile. A 3D skull mesh created with simplifying decimation algorithm was used to calculate a curvature analysis. **Results:** Twenty-six patients met inclusion criteria (mean age 25 months, SD 24 months; 9 females, 17 males; 14 sagittal, 8 metopic, 2 unicoronal, and 2 bicoronal). Eighteen patients

presented were younger than 12 months. Skull volume growth revealed no significant difference in study points versus controls ( $P < .01$ ). CI was also stable with consistent scores within specific types of craniosynostosis. The slope of change was not statistically different from 0 (slope  $< .002$ ,  $Pr > |t| > 0.15$ ). Even with early presentation  $< 12$  months, the slope of change in CI was still indistinguishable from 0. Regarding frontal morphology, there was no significant increase in AUC with time in patients with craniosynostosis. Using 3-D mesh analysis, no worsening of the skull shape was noted for any of the patients with craniosynostosis. **Conclusion:** Volume change is consistent with normal controls and CI remains stable over time. Anterior AUC and 3D curvature analyses also remain stable. This data set represents the largest morphometric analysis of unrepaired craniosynostosis. The skull deformity in craniosynostosis does not worsen over time. **Learning Objectives:** Understand the morphometric measurements utilized presently in craniosynostosis.

### 63 - The History of Plastic Surgery in Alberta

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**Introduction:** The Division of Plastic Surgery at the University of Alberta was established in 1965 by Mac Alton and Henry Shimizu. The program has become renowned for advancements in burn care through the integrated burn unit founded in 1970 that has flourished under Ted Tredget's leadership. The first functional upper limb replant in Canada was performed in Edmonton in 1974. Bert Fowlow and Harry Thompson were the first plastic surgeons in Calgary, arriving in 1960. The plastic surgery training program was started in 1976 by Dale Birdsell, who was also integral to establishing the burn unit with Robert Lindsay and hand clinic with Enzo Magi. **Purpose:** This report summarizes development of plastic surgery in Alberta and highlights important milestones. **Method:** Ten plastic surgeons from Alberta (49 currently active) were interviewed using an open, semi-structured format as part of the CSPA history project. Information from interviews with Drs Birdsell, Lindsay, Lobay, Shimizu, and Tredget formed the basis of the analysis. The data were corroborated by multiple sources and complemented by photographic and historic records. **Results:** Important advancements in the field of burn care prompted by oilfield burn incidents; these include research in hydrotherapy, silver-coated burn dressings, and hypertrophic scars. Descriptions of the first upper limb replant were obtained from both surgeons involved. Details of the serendipitous series of events that made the replant possible were recorded. **Conclusion:** Divisions of plastic surgery in Calgary and Edmonton have made significant contributions to burn treatment, auricular reconstruction, and microsurgery. Alberta surgeons' contributions have far surpassed the expectations for their small number. **Learning Objectives:** (1) Reflecting on historical milestones relevant to the CSPA meeting location will help attendees appreciate key regional

historical achievements. (2) Acknowledging Canadian contributions to plastic surgery will help surgeons refine their knowledge base and understand the importance of contributions for the future.

## POSTERS

### P01 - Concurrent Prophylactic Mastectomy, Immediate Reconstruction, and Salpingo-Oophorectomy in High-Risk Patients: A Case Series

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**Purpose:** Breast cancer is the most prevalent female malignancy worldwide and those identified as BRCA-carriers have an additional risk of ovarian cancer. There are limited data on coordinated breast and gynecological risk reduction surgery for high-risk patients in Canada. Therefore, this study aims to evaluate patient demographics, surgical details, and outcomes of prophylactic mastectomy (PM) with immediate reconstruction and bilateral salpingo-oophorectomy (BSO) in high-risk patients. **Methods:** We conducted a retrospective chart review at an academic center of patients who underwent PM with immediate reconstruction and concurrent laparoscopic BSO over a 7-year period. Patient risk factors, surgical indications, and treatment details were evaluated. **Results:** Sixteen patients underwent PM with immediate reconstruction and concurrent BSO. The mean age at the time of surgery was  $46.25 \pm 6.57$  years. Thirteen (81%) women were BRCA1 or 2 mutation carriers. Two patients had prophylactic surgical therapy for BRCA1 mutation and 14 (87.5%) patients had prior oncological treatment. The most common procedures performed were skin-sparing, nipple-sparing mastectomy (56.25%) and reconstruction with acellular dermal matrix (ADM) and implants (43.75%). All patients underwent laparoscopic BSO. The average combined case time was  $282.50 \pm 81.26$  minutes with an average postoperative hospital stay of  $1.33 \pm 0.49$  days. Six patients presented within 30 days with minor postoperative complications that did not require surgical intervention. Only 1 presented with surgical site infection. Complications occurred more frequently with alloplastic reconstruction. There were no gynecological complications. **Conclusions:** In conclusion, our results demonstrate that a combined multidisciplinary surgical approach did not increase length of stay or 30-day complication rates. Furthermore, concurrent risk reducing strategies are an effective option for patients at high risk of breast or ovarian cancer. **Learning Objectives:** To evaluate patient characteristics and surgical details of combined breast and gynecological risk reduction surgery.

## P02 - Stacked Lateral Thigh Perforator Flap (LTPF) as a Novel Option for Autologous Breast Reconstruction

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**Introduction:** Autologous breast reconstruction using perforator flaps offers excellent aesthetic outcomes while minimizing donor site morbidity and allowing for precise donor site selection. Currently, the deep inferior epigastric artery perforator (DIEP), profound artery perforator (PAP), and gluteal artery perforator (GAP) flaps along with the stacked flap technique are the most commonly used options. This study reports the first series of the stacked lateral thigh perforator (LTP) flap. **Methods:** A retrospective review of all stacked LTP flaps performed by the senior author was performed. Demographics, flap weights, complications, indications, and surgical technique were tabulated for each patient. **Results:** Eight female patients with a history of breast cancer underwent delayed unilateral breast reconstruction with stacked LTP flaps for a total of 16 flaps. The mean patient age, BMI, and flap and stacked flap weight were 56.5 years, 32.1 kg/m<sup>2</sup>, and 318.4 and 636.8 g, respectively. Microsurgical revascularization was completed in an antegrade and retrograde fashion to the internal mammary vasculature. Flap survival was 100% and one subsequent flap revision was performed. One patient developed a seroma at the donor site. The indications included insufficient abdominal tissue, prominent lateral thigh lipodystrophy, prior abdominal surgery, and failed prior abdominal based autologous reconstruction. **Conclusions:** This series demonstrates that the LTP flap is a reliable and effective option for a stacked breast reconstruction when the patient exhibits lateral thigh excess. Its ease of harvest, stemming from its reliable anatomy, straightforward dissection, and intraoperative supine positioning make it an appealing option for the reconstructive microsurgeon. The addition of the stacked LTP flap to the perforator flap collection allows the reconstructive surgeon to truly tailor breast reconstruction to the patient while focusing on body habitus and minimizing donor site deformity. **Learning Objectives:** (1) At the end of this presentation, the audience will be able to appreciate the benefits of using a stacked lateral thigh perforator flap as an option for breast reconstruction versus the deep inferior epigastric artery perforator flap. (2) The audience will also be able to distinguish which types of patients this procedure is ideal for based on desired outcome and past medical history.

## P03 - Clinical Presentation and Management of Spitz Nevi—A 15-Year Retrospective Review of Patients With Spitz Nevus at the Children's Hospital of Eastern Ontario

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**Introduction:** Paediatric Spitz nevi (SN) are fairly rare melanocytic lesions broadly classified as typical Spitz nevus (TSN), atypical Spitz nevus (ASN), and spitzoid melanoma (SM). To date, there are no evidence-based management guidelines for SN. This study aims to evaluate retrospectively the experience of managing the SN in a tertiary center. **Methods:** A retrospective review was conducted to identify patients diagnosed with SN from January 2001 to December 2016. Demographics, clinical presentation, histological features, management (eg, surgical or conservative), and outcome were collected in a REDCap database. Descriptive statistics were incorporated for data analysis. **Results:** From the cohort of 3524 charts identified with ICD-10 coding, 119 (3.4%) patients were found with the diagnosis of SN. The mean age was  $7.45 \pm 0.42$  years (33.6% patients  $\geq 10$ -year-old) with 50.4% males. The mean lesion size was  $0.79 \pm 0.09$  cm, mainly with dark brown pigmentation (44.4%) distributed mainly on the head and neck (33.3%) and lower limb (26.3%) regions. The histopathological diagnosis was obtained in 85 (71.4%) patients. There was a wide variability in the description of pathological features of the excised lesions, mainly TSN. Out of 85 lesions biopsied, 64.7% were excised completely, while 3.4% developed recurrence. **Conclusion:** The management of clinically diagnosed SN mainly involves surgical excision, which is associated with fairly good diagnostic yield and low recurrence rate. A more standardized approach to histopathological reporting should be considered in order to ease the differentiation between typical and atypical SN. We propose a score that could guide the management of SN in paediatric population. **Learning Objectives:** (1) To review the clinical presentation of pediatric patients referred to the Children's Hospital of Eastern Ontario with suspected SN. (2) To understand the pathophysiology of SN lesions, through microscopic descriptions extracted from the pathology reports. (3) To evaluate the current management and outcomes of patients with SN.

## P04 - 3-D Anthropometric Analysis in the Classification of Unilateral Cleft Lip Severity

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**Purpose:** Unilateral cleft lip has a spectrum of disease morphology which is not clearly described by current classification systems. For example, 2 clefts classified as "unilateral complete" can vastly differ in degree of deformity and thus differ in preoperative planning, procedure length, and surgical outcome. Current attempts to classify severity using objective measures employ cumbersome intraoperative caliper measurements with high variability or 2-D photogrammetry with inherent constraints on data collection. This study represents the first attempt to use 3-D photogrammetry with robust anthropometric analysis to accurately and objectively identify reliable measures of unilateral cleft lip severity. **Methods:** One hundred unrepaired unilateral cleft patients (ages 2 months-6 years) were photographed using the 3-D Vectra H1 handheld camera

(Canfield, New Jersey) during 4 Operation Smile missions to Malawi, Nicaragua and the Philippines from 2015 to 2017. Vectra software was used to autopopulate 27 anatomic landmarks from which 23 distances, 8 angles, and 5 ratios were obtained. Objective data were correlated with rank-order analysis by cleft surgeons blinded to anthropometric analysis. The most reliable and reproducible objective measures of unilateral cleft lip severity were identified. **Results:** Analysis of anthropometric landmarks revealed both previously described and novel measures predictive of cleft severity: 7 distances (cleft width, nostril width, nostril floor width, philtral height, alar length, alar width, and alar base height), 1 angle (columellar), and 2 ratios (nostril width, nostril floor width) were highly correlated with rank-order analysis (IRR 0.918). **Conclusions:** There exist several reliable and reproducible anthropometric measures which can be used to stratify cleft lip severity. The development of an objective severity scale will allow for enhanced preoperative planning and the development of future outcome studies. **Learning Objective:** The utility of 3-D photogrammetry in the analysis of cleft lip severity.

## P05 - Obesity-Induced Alterations in Human Adipose-Derived Stem Cells

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Obesity is hallmarked by excessive levels of free fatty acids, inflammation, and insulin resistance. Adipose tissue and adipocytes from obese individuals have been shown to be in insulin resistant state which is facilitated by excessive infiltration of inflammatory mediators. In this study, we explored the effects of obesity on the resident stem cell population in the adipose tissue, called adipose-derived stem cells (ADSCs), which give rise to the adipocytes in the adipose tissue. The ADSCs from obese individuals were found to have altered stemness, metabolic dysfunction, and substrate utilization compared with healthy ADSCs. The obese ADSCs also exhibited an insulin resistant state based on altered insulin-stimulated glucose uptake and differential secretion of pro- and anti-inflammatory adipokines. These results suggest that the altered inflammatory and metabolic landscape observed in obesity could be in part contributed by changes in the resident stem cells, in addition to the excessive accumulation of inflammatory cells in the obese adipose tissue. ADSCs are widely used as a source of stem cells in the field of regenerative medicine; nonetheless our results propose that the source of the cells should be prudently chosen for these cellular therapies as ADSCs derived from overweight and obese patients may show impaired therapeutic potential. Moreover, our study suggests that ADSCs in obese patients provide a potential novel target for treatment of obesity. **Learning Objectives:** (1) Obesity exhibits inflammatory changes in adipose tissue. (2) Altered glucose metabolism and insulin resistance are noted in adipose stem cells of obese patients. (3) Potential novel therapeutic

targets for the treatment of obesity may lie within these altered adipose stem cells.

## P06 - The Use of Intra-Arterial Thrombolytics for Severe Frostbite Injury: A Systematic Review and Meta-Analysis

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**Purpose:** For decades, the treatment for frostbite remained relatively unchanged. Recent retrospective studies have demonstrated a lower amputation rate for severe frostbite injuries with intra-arterial thrombolytics compared to conservative management. This meta-analysis estimates the frostbite amputation rate from the largest pooled sample of patients treated with intra-arterial thrombolytics in the literature to date. Meta-regression was used to investigate an association between amputation rates and known risk factors. **Methods:** Four databases were searched by 2 independent reviewers using keywords and MESH terms. Inclusion criteria included English language, patients with frostbite receiving thrombolytic treatment, and a listed amputation rate. Data extracted included threatened and amputated digits, frostbite stage, sex, age, intoxication, psychiatric condition, cold exposure duration, time to treatment, and thrombolytic protocol used. Digital amputation rates were estimated using a random-effects model. Association between digital amputation and known risk factors was investigated using meta-regression. **Results:** Literature search found 90 studies. After exclusion criteria was applied, a total of 21 articles were included in our study. Pooled data from these studies revealed 215 patients who underwent intra-arterial thrombolytics for treatment of their severe frostbite injuries. A total of 1525 threatened digits were affected with 359 digits requiring amputation leading to an overall amputation rate of 24.5% (SEM: 5.6, 95% CI: 12.6-36.2). The majority of patients were male sex. No association was detected between the remaining risk factors and amputation rates. **Conclusions:** Treatment with intra-arterial thrombolytics decreases the digital amputation rates for severe frostbite injury compared to literature values. Given these results, institutions should adopt multidisciplinary treatment guidelines that include intra-arterial thrombolytics in their treatment algorithm. **Learning Objectives:** (1) Review the intra-arterial thrombolytic protocol for severe frostbite injury and the contraindications for thrombolytics. (2) Determine the amputation rate for severe frostbite treated with intra-arterial thrombolytics.

## P07 - Feasibility of Implementing a Breast Reconstruction Database

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**Purpose:** To assess whether implementing a breast reconstruction database would be feasible in terms of time commitment, cost, and overall benefits in a tertiary care hospital. **Methods:** A survey was sent to 40 Canadian plastic surgeons who have a practice focused on breast reconstruction. The survey assessed demographics, practice characteristics, database use, and opinions on database construction. Univariate descriptive analyses were performed on all variables. **Results:** Thirty-one surgeons responded to the survey (77.5%). Most were from Ontario (29.1%) and worked in an academic center (83.9%). A total of 45.3% of surgeons performed more than 50 breast reconstructions yearly. Six (19.4%) surgeons utilized databases that were all started for quality improvement and research purposes. Databases included variables such as demographics, type of reconstruction, complications, surgeons involved, and type of implants. Data are inputs by research assistants (50%) for approximately 4.2 hours per month at a cost below \$200 per month. Databases are funded by research grants (50%), hospital funds (33.3%), and/or division funds (16.7%). Of the surgeons without databases, 60% have considered starting a database. Barriers include being too busy (72%) and impressions of the cost being too high (32%). Surgeons commonly felt that a database would be beneficial at their practice (80%), provincially (77.4%), and nationally (67.7%). **Conclusions:** Plastic surgeons are open to the idea of constructing a breast reconstruction database and that the costs and time required are lower than expected. Grants or integration with existing databases should be pursued on a provincial level first prior to pursuing a national database. **Learning Objectives:** (1) Appreciate the benefits and difficulties of constructing a breast reconstruction database. (2) Understand the current utilization rates and variables included for breast reconstruction databases across Canada. (3) Learn about ways your respective institution may pursue such a database.

### **P09 - Breast Implant–Associated Anaplastic Large Cell Lymphoma: A First Reported Canadian Case With Immediate Breast Reconstruction**

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**Purpose:** This study reports a first Canadian case of breast implant–associated anaplastic large cell lymphoma (BIA-ALCL) to undergo bilateral surgical treatment with immediate replacement of breast implants. The authors also present a review of current BIA-ALCL literature. **Method:** A comprehensive review of BIA-ALCL literature published in plastic surgery, oncology, and pathology journals was performed by entering the terms “Breast Implant-Associated Anaplastic Large Cell Lymphoma,” “BIA-ALCL,” “Case report,” and “Treatment” in PubMed. This report includes the initial clinical presentation, investigations, pathological analysis, and

oncological treatment of the case. **Result:** The case of a 50-year-old healthy Caucasian woman is discussed. She presented a delayed unilateral breast seroma 10 years after augmentation with textured silicone gel implants. Imaging and pathology were consistent with BIA-ALCL. The patient underwent bilateral implant removal, complete left breast capsulectomy, and immediate reconstruction with smooth gel implants. Current epidemiologic data, etiologic hypotheses, and treatment guidelines are summarized. **Conclusion:** This is the first Canadian BIA-ALCL case report describing immediate bilateral reconstruction. Workup and treatment outlined concur with current standards of care and should be offered to any patient presenting with delayed swelling and seroma formation around breast prostheses. **Learning Objectives:** The attendee will learn to (1) recognize the signs and symptoms associated with BIA-ALCL, (2) provide adequate counselling to women diagnosed with BIA-ALCL, and (3) become acquainted with current workup and treatment protocols pertaining to BIA-ALCL.

### **P10 - Reporting Time Horizons in Randomized Controlled Trials in Plastic Surgery: A Systematic Review**

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**Purpose:** Current guidelines for randomized controlled trial (RCT) reporting do not require authors to justify their choice of time horizon. However, the time horizon when an outcome is assessed has important implications for the interpretation of patient outcomes during treatment periods, as well as resources allocated to an investigation. Therefore, this study seeks to examine the standards of time horizon reporting in the plastic surgery literature. **Methods:** This is a systematic review of plastic surgery RCTs published within the last 4 years. The MEDLINE database was searched to yield relevant studies. All studies included were English language, prospective, nonpharmaceutical RCTs, comparing 2 plastic surgical interventions. Studies were classified into plastic surgery domains, and information regarding study population, time horizon reporting, and justification of chosen time horizons was extracted. **Results:** The search retrieved 720 articles, of which 103 were eligible for inclusion. Time horizons were reported as either a standardized time point at which all patients were assessed, a follow-up duration range, or were not reported at all. Although most studies (85.4%) reported a standardized time horizon, the majority (85.4%) failed to provide a valid justification to support their selection of time horizons. **Conclusion:** Clinical investigators failed to justify their choice of time horizons in the majority of published RCTs. To limit heterogeneity, time horizons for given interventions should be standardized to improve validity of outcome assessments, enable future pooling of results, and increase research efficiency. **Learning Objectives:** Readers of this study will recognize the

importance of standardizing and justifying time points in surgical outcome assessment so patient outcomes can be assessed more accurately. With a standardized approach to reporting time horizons in the literature, clinicians can pool more homogenous studies and make definitive conclusions that inform clinical practice.

## P11 - Long-Term Clinical Outcomes of Bilaminar Cultured Skin Grafts for Large-Sized Burns

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**Purpose:** Skin coverage remains a significant hurdle in large-sized burns. Recent advances have allowed to grow bilaminar cultured skin autografts (BCSGs) from patients' own limited donor sites. Having employed this technique clinically, the aim of this study was to report long-term outcomes in patients with large-sized burns. **Methods:** In total, 9 patients received BCSGs from January 2010 to May 2015. Except 1 patient who died during hospital admission, all patients were contacted and 4 agreed to partake in the study. Patients were tested with the Vancouver Scar Scale (VSS), QuickDASH questionnaire, and Burn Specific Health Scale (BSHS). Incisional biopsies of BCSGs were compared with patients' autografts. **Results:** From 4 patients, mean age was 40 years and mean TBSA was 70.3%. Average scores were 2.25 on the VSS, 29.5 on the QuickDASH, 36/36 for the psychosocial items, and 63/84 for the functional abilities on the BSHS. Compared with autografts, BCSGs demonstrated better pliability, VSS scores, and functional status. Biopsy specimens showed no evidence of malignancy or atypical changes, although multiple areas of hyperpigmentation were noticed. **Conclusion:** This is the first report investigating the long-term outcome of a newly developed bilaminar cultured skin graft. Bilaminar cultured skin autografts demonstrated comparable results with patients' autografts, average functional outcomes on self-reported questionnaires, and excellent psychological health-care states. Substantial precaution given the extensive unexpected hyperpigmentation must be taken and a prospective randomized controlled study is underway. **Learning Objectives:** (1) Describe the long-term outcomes in patients with large-sized burns having received BCSGs. (2). Understand the process used to grow BCSGs in laboratory.

## P12 - Four-Corner Fusion in SLAC and SNAC Wrist Surgery: Does Method of Fixation Really Make a Difference?

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**Purpose:** Four-corner fusion (4CF) has traditionally been reported to have a higher complication rate with similar functional outcomes as PRC. To date, there have been limited comparisons that specifically focus on whether the fixation method utilized in 4CF affects functional and clinical outcomes. In this study, we explored the differences in outcomes of 2 different fixation methods in 4CF. **Methods:** A retrospective chart review of a single surgeon's practice over a 10-year period was conducted to compare headless compression screw (HCSF) versus staple fixation (SF) in 4-corner fusion for SLAC or SNAC wrist. Primary functional outcomes included preoperative versus postoperative flexion-extension arc and grip strength and complication and fusion rates. **Results:** Sixty-two patients with 64 wrists were identified; 38 wrists were treated with HCSF and 26 with SF. Patients were followed on average for a 10-month period. HCSF patients had improved flexion arc postoperatively (108% of preoperative arc), whereas SF patients lost an average of 30.4% ( $P$  value:  $<.0001$ ). Grip strength was improved in both groups. A statistically significant higher complication rate was associated with SF (50%) versus HCSF (13.2%). Hardware failure (3), hardware associated pain (4), dorsal impingement (2), and infection (3) were the most common complications of SF, whereas neuropraxia (2) and hardware failure (3) with HCSF. The higher complication rate and equivocal functional outcomes traditionally reported for 4CF may be associated with specific fixation methods such as the SF. **Conclusions:** Patients treated with SF have a statistically significant greater loss of flexion-extension arc postoperatively, are immobilized longer, and experience a higher rate of complications and reoperations. Various fixation methods are available for 4CF; however, functional outcomes and complication rates are inconsistent among these methods. **Learning Objectives:** Functional and clinical outcomes are inconsistent between staple and screw fixation in 4CF. Method of fixation plays a key role in the success of 4CF.

## P14 - Alar Rim Reconstruction Following Congenital or Acquired Defects in the Pediatric Population

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**Purpose:** Although numerous techniques have been described for reconstruction of alar rim defects, there is a paucity of studies specifically addressing reconstruction in the pediatric population. We present a novel reconstructive technique, wherein an alar rotation flap in combination with an intra-nasal composite chondrocutaneous auricular graft are used to re-create the alar rim in children. **Surgical Technique:** From the superomedial extent of the defect or congenital cleft, a full-thickness incision is made along the alar crease, creating the alar flap. The flap is then rotated caudally and advanced medially into the defect. The intra-nasal mucosal defect is closed with a composite chondrocutaneous graft harvested

immediately caudal to the inferior crus of the auricle. **Methods:** We retrospectively reviewed all patients who underwent alar rim reconstruction at our institution, CHU Sainte-Justine, between 2000 and 2017. **Results:** A total of 8 patients with alar rim defects that were reconstructed with an alar rotation flap and auricular composite graft were identified. The majority ( $n = 6$ ) presented with alar defects secondary to traumatic necrosis, while 2 additional patients had congenital nasal clefts. The mean age at the time of surgery was 7.5 years. Composite graft survival was noted in all cases, with no morbidity at the harvest site. Mean length of follow-up was 2.5 years, where all alar defects were considered satisfactorily reconstructed, with an acceptable aesthetic maintained with growth of the reconstructed nose. **Conclusion:** While many authors have described use of an alar rotation flap for correction of alar rim deformities, the technique presented does not place additional scars on the nose and appears to maintain correction with nasal growth, thus presenting a reliable reconstructive option for both congenital and acquired alar rim defects in the pediatric population. **Learning Objective:** The attendee will be provided a method to reconstruct alar rim defects in children.

### P15 - Malpractice Litigation in Plastic Surgery: Can We Identify Patterns?

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**Purpose:** Malpractice litigation is commonplace in current medical practice, and no specialty is spared. Because surgical specialties have higher rates of malpractice cases, it is important for the plastic surgeon to understand the factors that contribute to litigation. **Methods:** We used the Westlaw legal database to conduct a comprehensive search of malpractice cases in plastic surgery in the United States in the following subspecialties: aesthetic, reconstructive, hand, and craniofacial surgery. We conducted both a Boolean and a natural language search to identify cases in which a plastic surgeon was the defendant. **Results:** Between 2000 and 2017, we found 594 cases. After an initial screening for relevance, we included 119 cases. These are the preliminary results of a comprehensive review of 30 of those cases. Most cases occurred in private practice ( $n = 25$ ; 83%). Only 2 cases (6.7%) mentioned a resident or fellow. Specialties most commonly involved in malpractice litigation were cosmetic and reconstructive surgery. The most common types of errors were gross negligence ( $n = 12$ ; 41%) and errors of commission leading to unwanted outcomes ( $n = 12$ ; 41%). Incomplete informed consent was the cause of action in 3 cases (10%). The majority of plaintiffs were female (28 female vs 2 male). Legal outcome was most commonly a jury verdict in favor of the surgeon ( $n = 19$ ; 70%). **Conclusion:** Malpractice litigation has a significant impact on health-care costs and important professional implications for health-care providers. Understanding the factors contributing

to malpractice cases in plastic surgery is critical in order to recognize patterns and identify opportunities to address common errors. **Learning Objectives:** Participants will be able to (1) recognize plastic surgery subspecialties commonly involved in malpractice litigation, (2) identify plaintiff demographic characteristics and the reasons that bring them to litigation, and (3) identify common pitfalls that lead to litigation and how surgeons can avoid them.

### P16 - Pre-Operative Radiation Therapy in Sarcoma Reconstruction With Vascularized Tissue

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**Purpose:** Radiation therapy (RT) is recommended for appropriately selected patients with sarcoma to minimize the risk of local recurrence and to maximize outcomes of disease-free survival and function. Wound complications have been thoroughly studied in irradiated sarcoma defects; however, little is known about microsurgical complications. The purpose of this study was to confirm the safety of vascularized tissue reconstruction in previously irradiated sarcoma defects. **Method:** A retrospective review of all patients treated by the senior author for sarcoma reconstruction from January 2005 to July 2017 was performed. Two independent reviewers collected data from both electronic and paper medical records. Patients were included if they underwent flap reconstruction (pedicled or free) following sarcoma resection. The safety of neoadjuvant RT was compared to a control group with no previous radiation using  $\chi^2$  analysis. **Results:** Fifty-seven patients were included in the study: 35 patients were included in the preoperative RT group and 22 patients were included in the control group. There was no significant difference in wound complications included between the 2 groups (infection, dehiscence, hematoma, and seroma). There was also no significant difference in microvascular complications (arterial thrombosis, venous thrombosis, partial/total flap loss). **Conclusions:** The current study demonstrates the safety of vascularized tissue reconstruction in previously irradiated sarcoma defects. Judicious selection of reconstructive technique and recipient vessels are crucial in obtaining optimal outcomes given the damaging effect of RT on native tissues. **Learning Objectives:** Preoperative radiation therapy for sarcoma reconstruction has been shown to improve survival and the current study demonstrates that it is not associated with greater risk of wound or microvascular complications.

### P17 - A Novel, Noninvasive Technique for Assessing Tissue Perfusion in Flap Reconstruction

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**Purpose:** Mastectomy skin flap necrosis is a dreaded complication in breast reconstruction. And current literature quotes an occurrence rate of 10% to 15%. Clinical assessment of mastectomy flap ischemia is consistently shown to be an unreliable predictor of actual necrosis. The purpose of our series is to assess the usability and predictability of a novel skin perfusion assessment technology that uses near-infrared spectroscopy (Kent Imaging Device). **Method:** A selection of reconstructive surgical cases where tissue perfusion could be assessed were selected for testing using the imaging device. Patients were imaged preoperatively as a baseline, intra-operatively, and up to 3 weeks postoperatively to assess tissue viability and evidence of necrosis. **Results:** A total of 15 cases were tested using the imaging device. Examples of procedures tested were mastectomies with both autogenous and alloplastic immediate reconstructions, finger replantation, sarcoma reconstructions, and skin flaps post-groin dissection. We found that the imaging device was accurate with clinical suspicion of decreased skin perfusion and did predict the development of skin necrosis in a few cases. However, we did identify artifacts, such as methylene blue and dark skin (Fitzpatrick V/VI), that make interpretation of values unreliable. Images of cases to be presented. **Conclusions:** The imaging device uses near-infrared spectroscopy to measure tissue oxygenation of tissue. Although there are some areas for improvement, our experience shows that this technology is easy to use and does correlate with up to 3-week postoperative skin necrosis. A prospective 2-center trial is currently underway to understand whether this technology could predict skin flap necrosis and augment clinical judgment. **Learning Objectives:** (1) To understand the basics of a novel perfusion imaging technology. (2) To highlight the use of tissue perfusion technology in a wide range of reconstructive scenarios.

### P18 - Modified Delphi Method to Establish Preoperative Reporting Priorities for CTA/MRA in Deep Inferior Epigastric Perforator (DIEP) Breast Reconstruction

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**Purpose:** Preoperative imaging is used to assist in planning for microvascular breast reconstruction. Consensus from an expert panel of reconstructive microsurgeons was sought to guide standardization of reporting of abdominal CTA/MRA for breast reconstruction. **Method:** A Modified Delphi method with a panel of eleven microsurgery experts was conducted. In round 1, participants shared their general preferences for preoperative imaging and perforator characteristics. In round 2, the panel responded to and commented on themes that emerged from the previous survey results and ranked perforator selection priorities. In the final round, consensus was sought. Recommendations for radiologist imaging reports were proposed and clarified. **Results:** The most important perforator

characteristics in selecting a perforator for DIEP flap include, in the order of importance: diameter of vein, location within flap, diameter of artery, territory of perfusion of vessels, intramuscular course, and distance. Considerations of prioritizing lateral versus medial row perforators were identified. The most important considerations in a preoperative radiology report were also ranked. Perforators above the umbilicus should be reported when appropriate perforators are missing below the umbilicus in the hemi-abdomen. Presence of the superficial deep inferior epigastric vein should be commented on for each hemi-abdomen. Volume-rendered 3-D reconstructions were not essential to decision-making. **Conclusions:** The most important data that our expert panel consider when using preoperative imaging for planning DIEP flap reconstruction have been identified. Interprofessional collaboration between expert surgeons and radiologists will enable the construction of a standardized report template, highlighting the most important characteristics of perforator anatomy on preoperative imaging. **Learning Objectives:** (1) To describe surgically relevant imaging findings of perforator anatomy for DIEP perforator flap reconstruction. (2) To enhance communication of relevant information between radiologist and reconstructive microsurgeon.

### P19 - Designing a Novel Instructional Video to Teach Suturing to Medical Students

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**Purpose:** Videos teaching sleight-of-hand have long made use of multiple camera angles, including “the magician’s view.” Like sleight-of-hand, surgery requires dexterous motor hand movements. Industry standard suturing tutorials typically use single-angle shots in succession. We propose a suturing tutorial video with simultaneous multi-angle views will improve medical students’ propensity to learn more than a single-angle view. **Methods:** First- and second-year medical students at Dalhousie University completed a questionnaire on suturing experience, sex, age, handedness, and past training in coordinated upper-limb activities, for example, sports, visual art. Respondents were divided into 2 suturing experience-matched groups. Participants were video-recorded completing 4 increasingly difficult tasks: (1) simple interrupted, (2) horizontal mattress, (3) deep dermal, and (4) closure under tension. Materials included a pig-belly model, suturing equipment, and a tutorial video in a private room. Participants were blinded to their multiangle or single-angle condition. Participants completed a self-rated Likert-type confidence survey pre- and post-trial. Completion time for each task was measured using the video recordings. *T* tests and ANOVAs were used to analyse data. Recordings will be scored using the modified Global Rating Scale of surgical skill (Martin et al, 1997). **Results:** Twenty-seven medical students participated in the experiment. Groups were experience matched (0, 1, or 2 past suturing workshops attended). Multiangle and single-angle groups had lower pre-

(2.23; 2.29) than post-trial confidences (2.92; 2.64;  $P = .003$ ;  $P = .019$ ). Low- and medium- but not high-experience groups had lower pre- (2; 2.72) than post-trial (3; 2.64) confidences ( $P = .092$ ;  $P = .019$ ). Multi-angle (118 seconds) completion time was faster than single-angle (137 seconds;  $P = .013$ ). Multi-angle was faster than single-angle for tasks 2 (127 and 151 seconds;  $P = .0008$ ), 3 (111 and 135 seconds;  $P = .0006$ ) and 4 (138 and 154 seconds;  $P = .027$ ), but not 1. **Conclusions:** Results support that medical students can learn to suture more easily using multiangle tutorial videos, leaving students with higher confidence. **Learning Objectives:** (1) Understand how the delivery of surgical skills teaching can be optimized for medical students. (2) Identify individual factors affecting the efficacy of surgical skills acquisition.

## P20 - Nerve Transfers to the Triceps Muscle: Surgical Technique and Clinical Outcomes

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**Purpose:** To report the clinical outcomes and describe the surgical technique of restoring triceps muscle reinnervation using 2 different nerve transfers: flexor carpi ulnaris (FCU) nerve branch and posterior branch of axillary nerve. **Methods:** A retrospective review of patients undergoing FCU or posterior branch of axillary nerve to triceps nerve branch transfer is performed. The surgical technique for both procedures is described. Outcome measures include preoperative and post-operative British Medical Research Council score, range of motion (ROM), disabilities of the arm, shoulder and hand (DASH) score, visual analog scale (VAS) for pain, and complications. **Results:** Between September 2003 and April 2017, 6 patients were identified. Four patients with a traumatic upper trunk and posterior cord palsy underwent FCU to triceps nerve branch transfer. Two patients with a recovering upper trunk after a pan brachial plexus palsy underwent posterior branch of axillary to triceps nerve branch transfer. Mean age was 36.3 (range, 18-68) years. Surgery was performed at a mean of 7.0 (range, 5.0-8.9) months post injury, with a mean follow-up of 18.6 (range, 6.3-31.4) months. Preoperatively, 4 patients exhibited grade M0 and 2 patients exhibited grade M1 triceps strength. Four patients had M5 donor muscle strength and 2 had grade M4. Postoperatively, 3 and 1 patients recovered M4 and M4+ triceps strength, respectively. Two patients recovered grade M2+ only. Mean DASH and VAS improvement were 20.8 (range, 13.3-31.6) and 4.4 (range, 1.4-6.4) points, respectively. There were no complications. **Conclusions:** In extensive brachial plexus palsy cases with limited donor nerves, nerve fascicles to the FCU and posterior branch of axillary nerve are viable options for triceps muscle reinnervation. **Learning Objectives:** Participants will learn the indications, contraindications, surgical technique, and clinical outcomes of

FCU nerve branch and posterior branch of axillary nerve to triceps nerve branch transfer.

## P21 - Toward Minimally Disruptive Medicine: Assessing the Need for Mobile Health Care in Monitoring the Diabetic Lower Extremity

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**Purpose:** To develop a mechanism for more frequent monitoring of the diabetic lower extremity, we sought to (1) characterize the daily self-management routines of diabetics, (2) evaluate patient and clinician opinion on the use of mobile healthcare (mHealth) in this space. **Methods:** Patients with diabetic foot ulcers (DFUs) presenting to wound clinics at St Michael's Hospital in Toronto, Ontario, completed a 25-item questionnaire addressing their disease, foot checking practices, mobile phone use, and views on mHealth. Wound care clinicians across Canada were surveyed using a 9-item questionnaire addressing similar issues. **Results:** One hundred fifteen patients completed the questionnaire. A total of 51.3% of patients spend less than a minute checking their feet, and 15% of patients find it difficult to see their doctor or get to the hospital. Mobile phone use was widespread (80.4% of respondents). Of mobile phone users, 73.1% would use a device on their phone to help them check their feet. Two hundred two clinicians completed the questionnaire, most of whom were nurses or nurse practitioners (73.8%). Only 3.5% of clinicians were very familiar with mHealth, but 92% were interested in using mHealth to monitor their patients between visits. Patient education and clinician training were identified as the major barriers to mHealth use. **Conclusions:** Patients with DFU have suboptimal foot care practices which may be improved with mHealth. Clinicians treating patients with DFUs are unfamiliar with mHealth, but would be amenable to adopting it into their practice. mHealth technology is a promising way to monitor the diabetic lower extremity. **Learning Objectives:** There is currently no mHealth tool for monitoring DFUs, although there is evidence that regular monitoring reduces the rate of amputation significantly. This study demonstrates that both patients and clinicians would be amenable to using mHealth in order to improve health outcomes associated with DFUs.

## P22 - Objective Sensory Outcomes Following Reconstruction for Neonatal Brachial Plexus Injury

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**Purpose:** Neonatal brachial plexus injury (NBPI) can lead to significant functional impairment for affected children.

Reconstruction and rehabilitation has traditionally focused on motor recovery, and currently little is known about sensory recovery in these patients. The purpose of this study was to objectively assess sensory outcomes in patients with NBPI in a Canadian centre. **Methods:** A case series pediatric patients followed prospectively in the Upper Limb Clinic in Edmonton, AB was constructed and analyzed. Inclusion criteria included any patient with an upper trunk NBPI who underwent nerve reconstruction and was capable of cooperating with objective sensory testing. Sensory modalities assessed include Semmes-Weinstein (S-W) monofilament testing in the median nerve distribution and motor-enhanced tactile perception stereognosis (MES). All testing was performed by an occupational therapist with extensive experience in neonatal BPI. **Results:** To date, 10 patients have completed objective sensory testing (9 patients who underwent distal nerve transfers and 1 who had plexus reconstruction with sural nerve grafts). The average age at time of testing was  $6.8 \pm 1.3$  years. S-W testing of the median nerve revealed both a median and mode result of 2.83 g (normal = 2.83 g, range 2.82-3.22 g). Motor-enhance tactile perception stereognosis had a median score of 9.5 (range 6-10). The most commonly missed associative pair was "button and penny" (4 patients). **Conclusions:** Pediatric patients with upper trunk NBPI with indications for motor nerve reconstruction appear to maintain near-normal distal sensory function in the affected extremity. **Learning Objectives:** (1) Data on sensory outcomes in neonatal brachial plexus injury is scarce. (2) Patients with upper trunk injuries maintain adequate distal sensory function even in the presence of significant motor dysfunction.

### P23 - Longitudinal Evolution of Oximetry (SpO<sub>2</sub>) in Infants With Robin Sequence (RS)

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**Purpose:** Various tools are used to evaluate airway obstruction in infants with RS and monitor treatment. The purpose of the study was to explore the role of serial oximetry and document the evolution during the first year of life for different treatments. **Methods:** We reviewed all oximetry data accumulated in the first year of life. Treatment consisted either of prone position (prone), use of nasopharyngeal airway (NPA), tongue-lip adhesion (TLA), or mandibular distraction osteogenesis (MDO). Desaturation index (drops in SpO<sub>2</sub>  $\geq 4\%$ , DI4%; normal  $\leq 8$  events/h) and % time  $<90\%$  (normal  $\leq 0.2\%$ ) were used as parameters for airway obstruction. **Results:** Twenty-three infants had serial data available. DI4% at 1-week (pre-treatment) was higher in TLA, MDO, and NPA groups than in prone ( $P < .001$ ). All infants improved over time, however, improvement was faster for infants undergoing surgery and much slower for NPA ( $P < .01$ ). By 3 months, there was no longer a difference between the 2 surgical groups and the prone group. By 1 year of age, all infants except 1 in the NPA group had normal or near-normal oximetry and polysomnography. The results were very similar for % time  $< 90\%$  parameter.

**Table.** DI4% (event/hour).

Treatment	1 Week	1 Month	3 Months	5-6 Months	10-12 Months
Prone (n = 11)	29.7	19.2	9.3	6.1	6.6
NPA (n = 4)	65.1	64.2	27.1	13.5	8.1
TLA (n = 4)	58.9	11.0	8.9	5.5	5.0
MDO (n = 4)	70.7	94	6.2	5.7	5.6

**Conclusion:** Serial oximetry is a useful tool to monitor RS infants, demonstrating that TLA and MDO both resulted in the most rapid improvement in oximetry at 1 month that was matched by prone by 3 months. NPA was associated with the longest time to normal oximetry. **Learning Objective:** To better understand the evolution of oximetry measures for RS infants in the first year of life.

### P24 - Characterization of a Biomarker Profile in Trapeziometacarpal Osteoarthritis

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**Methods:** End-stage TM OA patients without concurrent hand pathology were recruited. Patient-reported outcomes were recorded at baseline and 6 weeks postoperatively. Blood, TM, synovial fluid (SF), and synovium were collected at baseline and/or 6-week postoperatively. Neutrophils, T-cells, NK cells, and monocytes/macrophages were detected by flow cytometry. Cytokines were detected in plasma. Cell type frequency in joint environment relative to venous blood is reported. Joint specific and/or systemic biomarkers correlated to patient-reported pain was incorporated into an unadjusted regression analysis model. **Results:** Compared to blood, T-helper:non-T-helper cell ratio decreases from 2.33 to 1.11 in SF and increases to 6.22 in synovium. In SF and capsule, early (CD69), intermediate (CD25), and late (HLA-DR) activated T-cell phenotypes were elevated relative to blood. Inflammatory CD14+CD16+ monocyte/macrophages subpopulation are enriched in both SF and synovium. Plasma cytokine data suggest a difference in the general plasma cytokine response to trapeziectomy in males and females. A positive correlation of VAS health score to bFGF concentration ( $r^2 = 0.4457$ ,  $P = .0494$ ) and a negative correlation of VAS pain score to IP-10 concentration ( $r^2 = 0.5994$ ,  $P = .0410$ ) may exist. **Conclusion:** TM OA has a significant inflammatory component. Cellular biomarkers demonstrate elements of an activated, adaptive immune response in the arthritic joint. Cytokine responses demonstrate different potential phenotypes that may be useful for predicting response to treatment. Definitive associations in changes to cytokine expression cannot be made based on these early data. **Learning Objectives:** The audience will gain insight into what cytokine and cells play a role in TM OA and patient-reported outcomes.

## P25 - The Impact of Delaying Breast Reconstruction on Patient Expectations and Health-Related Quality of Life: An Analysis Using the BREAST-Q

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**Purpose:** An understanding of patient expectations predicts better health outcomes following breast reconstruction. No study to date has examined how patient expectations for breast reconstruction and pre-operative health-related quality of life vary with time since breast cancer diagnosis. **Method:** Women consulting for breast reconstruction to a single surgeon's practice over a 13-month period were enrolled in this cross-sectional study. Patients were asked to prospectively complete the BREAST-Q expectations and pre-operative reconstruction modules. A retrospective chart review then performed on eligible patients, and patient demographics, cancer-related factors, and comorbidities, were collected. Scores were transformed using the Rasch method. Multivariate linear regression models were constructed to assess the association between BREAST-Q scores and time since diagnosis. **Results:** Sixty-five patients met inclusion criteria for analysis and are characterized by a mean age of  $53 \pm 11$  (33-79) and a mean BMI of  $28 \pm 6$  (19-49). Most patients were treated by mastectomy (58%) or lumpectomy (23%). At the time of retrospective review, 29 (43%) patients had undergone reconstruction, most of which were delayed (59%). The mean latency from diagnosis to reconstruction was  $685 \pm 867$  days (range: 28-3322 days). Latency from diagnosis to reconstruction was associated with greater expectation of pain ( $\beta = 0.5$ ; SE = 0.005; 95% CI: 0.003-0.027;  $P < .05$ ), and slower expectation for recovery ( $\beta = -0.5$ ; SE = 0.004; 95% CI: -0.021-0.001;  $P < .05$ ). Latency from diagnosis to reconstruction was associated with increased preoperative psychosocial wellbeing ( $\beta = 0.578$ ; SE 0.009; CI: 0.002-0.046;  $P < .05$ ). **Conclusion:** Delaying breast reconstruction may negatively impact patient expectations of postoperative pain and recovery. Educational interventions aimed at understanding and managing patient expectations in the preoperative period may improve health-related quality of life and patient-related outcomes following initial breast cancer surgery. **Learning Objectives:** To help understand how patient expectations and preoperative health-related quality of life change from time of breast cancer diagnosis onwards.

## P26 - Dog Bites in Children: A Descriptive Analysis

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**Purpose:** Describe characteristics of dog bites and their treatment in a paediatric population including infection, medical specialties involved, rates of admission, and need for surgery. **Method:** Patients presenting with a diagnosis of a dog bite to the emergency department of a tertiary care paediatric hospital between January 1, 2015, and June 30, 2017 were included. Details related to demographics, admission, infection, complications, consultations, and treatment were extracted from the patients' records. Descriptive statistics were performed and binary logistic regression was used to assess potential predictors of infection. **Results:** One hundred fifty-eight patients with dog bite were identified. Most patients were male (53.8%) and less than 5 years of age (50%). Bites occurred most frequently in June (13.3%) and July (16.5%). The face was most commonly involved (42.9%), followed by the hands (12.6%) and the scalp (26.6%). Pit bulls (11.4%), Labrador retrievers (7.0%), and German shepherds (4.4%) were the most common offending breeds. Most bites were superficial (91.1%). Half were treated conservatively with dressings and petrolatum-based ointment, with 41.1% requiring simple primary closure. Ten cases necessitated primary repair in the main operating room under general anesthesia (6.3%). More than half of patients were treated with prophylactic systemic antibiotics (55.1%). Plastic surgery was the most common service involved (24.7%). Seven patients developed an infection (4.4%) and there were no mortalities or long-term complications. Rates of infection did not differ between patients who did or did not receive prophylactic systemic antibiotics ( $P = .88$ ). Regression analysis revealed no significant predictors of infection. **Conclusions:** Most dog bites are superficial and involve the head and hands. Infection rate is low, with no significant difference in infection rates between patients treated with or without prophylactic antibiotics. **Learning objectives:** Understand the epidemiology and complications of dog bites in the paediatric population. Understand the role of prophylactic antibiotics in dog bites.

## P27 - Outcomes of Elbow Flexion Reconstruction in Patients Over 50 With Traumatic Brachial Plexus Injury

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**Purpose:** There is controversy regarding the effectiveness of brachial plexus reconstruction and eventual elbow function in older patients as it is reported that outcomes are poor. The aim of this study is to determine the outcomes of elbow function in patients over the age of 50 and factors related to success. **Methods:** Fifty-eight patients over the age of 50 underwent nerve grafting, nerve transfers or free functioning muscle transfer (FFMT) to improve elbow function after a traumatic brachial injury. Patients were evaluated preoperatively and postoperatively for elbow flexion strength and range of motion

(ROM), Disability of the Arm, Shoulder, and Hand (DASH) scores, pain, age bracket, gender, body mass index (BMI), delay from injury to operation, concomitant trauma, severity of trauma, and type of reconstruction. **Results:** The average age was 57.8 years (range 50-72) with an average follow-up of 24.0 months. The average modified British Medical Research Council (BMRC) elbow flexion grade improved significantly from 0.26 to 2.63. Thirty-three (60%) patients achieved functional elbow flexion  $\geq$ M3 postoperatively, compared to 0 patients preoperatively. There was no correlation between age or age range stratification and modified BMRC grade of those obtaining useful elbow flexion. Active elbow ROM improved significantly postoperatively, with no effect of age or age range on elbow flexion motion. More patients achieved  $\geq$ M3 elbow flexion with nerve transfers (69%) compared to FFMT (43%). Patients had worse outcomes with high energy/velocity injuries. The mean DASH score decreased from 51.5 to 49.6 postoperatively and the average pain score decreased from 5.0 to 4.3. **Conclusion:** Brachial plexus reconstruction for elbow function in patients over the age of 50 can yield useful elbow function and age should not be used as an exclusion criterion for nerve transfer, grafting, or FFMT reconstruction. **Learning Objectives:** (1) To understand the role of elbow flexion reconstruction in patients older than 50 years with traumatic brachial plexus injuries. (2) To appreciate that nerve transfers are superior to free muscle transfers in older patients to regain elbow flexion after brachial plexus injuries.

## P28 - A Shift on the Horizon: A Systematic Review of Assessment Tools for Plastic Surgery Trainees

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**Purpose:** As Canadian plastic surgery programs transition toward a Competence by Design (CBD) program, it is important to critically assess current methods of evaluating trainee competence. The purpose of this systematic review was to identify and evaluate assessment tools for technical and non-technical competencies in plastic surgery. **Methods:** A systematic search was conducted using keywords related to competency-based medical education, assessment, and plastic surgery. Two independent reviewers extracted data pertaining to study characteristics, study design, and psychometric properties. Data regarding the establishment of competence and barriers to tool implementation were noted. **Results:** Twenty-three studies were included in the review. Technical competencies were assessed in 16 (70%) studies. Nontechnical competencies were assessed in 5 (22%) studies. Two (9%) studies assessed both technical and nontechnical competence. Six (26%) tools were implemented in a simulated setting and 17 (74%) tools were implemented in a clinical setting. Thirteen (57%) studies did not report reliability scores and 9 (39%) did not report validity

scores. Two (9%) tools established clear definitions for competence. Common barriers to implementation included high time and resource demands, uncertainty about simulation transferability to the operating room, and assessor burnout. **Conclusions:** A number of tools exist to assess a range of plastic surgery skills, both in clinical and simulated settings. Additional psychometric testing of these tools is required, particularly for nontechnical skills. This review offers a useful guide upon which to build assessment frameworks for Canadian plastic surgery residency programs seeking to implement the CBD mandate. **Learning Objectives:** To demonstrate the diversity of tools currently available for implementation in Canadian plastic surgery programs as they transition to CBD. To suggest next steps for plastic surgery competency tool creation and modification.

## P29 - Outcomes of Shoulder Abduction After Nerve Surgery in Patients Over 50 Following Traumatic Brachial Plexus Injury

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**Purpose:** There is controversy regarding the effectiveness of brachial plexus reconstruction in older patients as it is felt that outcomes are poor. The aim of this study is to determine the outcomes of shoulder abduction obtained after nerve reconstruction in patients over the age of 50 and factors related to success. **Methods:** Forty patients over the age of 50 underwent nerve surgery to improve shoulder function after a traumatic brachial plexus injury. Patients were evaluated preoperatively and postoperatively for shoulder abduction strength and range of motion (ROM), Disability of the Arm, Shoulder, and Hand (DASH) scores, pain, age bracket, gender, body mass index (BMI), delay from injury to operation, concomitant trauma, severity of trauma, and type of reconstruction. **Results:** The average age was 58.2 years (range 50-77) with an average follow-up of 18.8 months. The average modified British Medical Research Council (BMRC) shoulder abduction grade improved significantly from 0.23 to 2.03 ( $P < .005$ ). Fourteen patients achieved functional shoulder abduction of  $\geq$ M3 postoperatively. There was no correlation between age or age range stratification and BMRC grade or those obtaining useful shoulder abduction  $\geq$ M3. Active shoulder abduction improved significantly from 18.25° to 40.64°, with no difference based on age or age stratification. There were improved modified BMRC grades with nerve transfers versus nerve grafts. Less patients achieved  $\geq$ M3 function if surgery was delayed >6 months. The mean DASH score decreased from 45.3 to 40.7 postoperatively and the average pain score decreased from 3.7 to 3.0. Patients with higher postoperative BMRC grade for shoulder abduction had improved postoperative DASH scores and VAS for pain ( $P = .011$  and  $.005$ , respectively). **Conclusion:** Brachial plexus nerve reconstruction for shoulder abduction in patients over the age of 50 can yield useful BMRC



scores and ROM and age should not be used to exclude nerve reconstruction in these patients.

### P30 - Management and Outcomes of Clinical Scaphoid Fractures in Children

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**Purpose:** Acute wrist pain with a history and physical examination worrisome for a scaphoid fracture but normal X-rays is known as a clinical scaphoid fracture. Standard treatment involves immobilization and repeat X-rays in 10 to 14 days. When repeat X-rays are normal but a scaphoid fracture is still clinically suspected, the optimal management in children is unknown. Our objective was to determine the rate of scaphoid fractures and evaluate the optimal management of these patients. **Method:** A retrospective study was performed of all patients over a 2-year period presenting to a tertiary pediatric centre with a clinical scaphoid fracture. Patients were included if they had 2 negative X-rays within 14 days post-injury but persistent clinical signs. **Results:** One hundred thirty children (mean age 12.6 years old, 95% CI: 12.2-13.0) were identified with a clinical scaphoid fracture. Eighteen (14%) patients underwent CT or MRI at a mean of 10.2 weeks post-injury (95% CI: 5.0-15.3). Three patients (2%) were diagnosed with a scaphoid fracture by X-ray or CT at an average of 5.7 weeks post-injury (range 4.3-6.6). Other carpal fractures or ligamentous injuries were identified in 3 patients (2%) by MRI or CT (mean time 17 weeks post-injury, range 4-42). Most patients (98%) were treated with immobilization (mean duration 4.8 weeks, CI: 4.2-5.4). Ninety percent of patients healed within 12 weeks (median 4.1 weeks, CI: 5.1-9.0). No patients underwent surgery. **Conclusion:** The incidence of true scaphoid fracture was 2% in children presenting with clinical suspicion but negative X-rays within 14 days post-injury. The role of cross-sectional imaging or optimal management of these patients has not been well established. **Learning Objectives:** (1) Recognize the rate of fracture among pediatric clinical scaphoid fractures. (2) Understand the management options for pediatric clinical scaphoid fractures.

### P31 - A Ten-Year Epidemiology Based Study of Acute Pediatric Burn Injuries at a Tertiary Care Center

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**Method:** Data were extracted from the Alberta Children's Hospital (ACH) burn database registry. These data are collected on all children (<18 years) who had a burn injury between January 2006 and December 2015. Data collected include patient age,

gender, date of burn, location of burn, mechanism of burn, total body surface area (TBSA) of burn. **Results:** Patients had a mean age of 4.4 years (range 9 days to 18 years) and 57% were male. The majority of the patients were admitted with burns of the wrist and hand (42%), and 21% were admitted with burns in multiple regions. Burns seen at ACH were referred from peripheral hospitals 38% of the time. A temporal trend of increased admissions was seen (6% of all burns were admitted in 2006 vs 16% in 2015). Scald spills and contact burns had the highest of incidence of mechanism of burn (41% and 32%, respectively) with the hot water and tea being the most common liquids involved (35% and 29%, respectively). The largest number of burn admissions occurred during the months of July and December (19%), while the fewest occurred during the months of May and November (14%). **Conclusion:** This study provides important information regarding the epidemiologic features of acute burn injuries requiring hospital admission as well as insights into the factors associated with burn injured patients and mechanisms of injury. **Learning Objective:** (1) To determine the incidence and mechanism of burns in the pediatric patient population. (2) Identify potential areas of prevention for pediatric burn injuries.

### P32 - The Impact of Implant Placement on Breast Cancer Characteristics: A Systematic Review and Meta-Analysis

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**Purpose:** There is a paucity of data comparing the oncologic properties of breast cancer among patients previously having undergone breast augmentation in either the subglandular or subpectoral planes. The objective of the present systematic review and meta-analysis was to evaluate whether implant location influenced the characteristics of breast tumors in previously augmented women. **Methods:** A systematic literature search was performed to identify relevant articles reporting tumor characteristics in augmented patients. The search included published articles in 3 electronic databases—Ovid MEDLINE, EMBASE, and PubMed. Comparative studies (subglandular vs subpectoral) were included. **Results:** Analysis of data pooled from the included studies showed that subglandular implants were associated with larger tumours at presentation, with borderline statistical significance ( $n = 122$ ,  $P$  value = .08). There was no significant difference when comparing both the cancer stage and lymphovascular invasion between both groups ( $P = .13$  and  $P = .39$ , respectively). **Conclusion:** With the absence of meta-analyses or large randomized controlled trials, our study provides surgeons with an evidence-based reference to improve informed consent with regard to implant placement. **Learning Objectives:** (1) To summarize the current literature and evaluate the impact of implant location on breast cancer characteristics. (2) To

understand the limitations on breast cancer detection in the presence of implants.

### P33 - Outcome Measures in the Breast Reduction Literature: A Systematic Review

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**Purpose:** The purpose of this systematic review is to (1) identify all outcomes utilised in reduction mammoplasty literature and (2) perform a thorough analysis of retrieved outcomes to identify trends and variations in the literature. **Methods:** A systematic review was performed to identify breast reduction articles that were either randomized controlled trials or non-randomized trials including at least 100 cases. A standard search strategy was used on journals from earliest entry to January 2017. Data extraction, critical appraisal, and synthesis were conducted therein. **Results:** The search yielded 2725 unique articles, and 107 articles were included in the analysis. Fifty-seven unique outcomes were identified. Safety, aesthetic, quality of life, and cost-related outcomes were identified in 85, 36, 38 and 10 % of articles, respectively. Postoperative complications were the most frequent outcome utilised in these studies, present in 82% of papers. Patient-reported outcome measures were present in 44% of studies. Outcomes were measured for an average of 15 months. Only 15% of outcomes were clearly defined within their respective article. **Conclusions:** There remains a lack of consistency in the outcomes studied within the breast reduction literature. When making clinical decisions, it is important to have a complete set of outcomes from which to draw conclusions. In addition, uniformity of outcomes across studies is important, particularly when pooling data in a meta-analysis. Currently, there is no consensus on what complement of outcomes should be universally included when studying reduction mammoplasty. **Learning Objectives:** By the end of this exhibit, the viewer should (1) identify trends in outcomes used within the breast reduction literature and (2) draw conclusions on the lack of consistency between studies with respect to these outcomes.

## RESIDENT POSTER CORNER

### RP01 - Acetyl-L-Carnitine to Enhance Peripheral Nerve Regeneration in Carpal Tunnel Syndrome: A Randomized Control Trial

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**Purpose:** Carpal tunnel syndrome (CTS) is the most common form of peripheral nerve injury. While surgery is effective in milder cases, recovery can be incomplete in severe CTS.

Therefore, there is a need for adjuvant methods to improve nerve regeneration. Acetyl-L-carnitine (ALCAR) has been shown to be efficacious in various neuropathies. However, it has not been studied in compressive neuropathies. This randomized control trial examines the effect of ALCAR on peripheral nerve regeneration in CTS. **Methods:** A pilot study was completed utilizing a double-blind randomized placebo controlled design. Inclusion criteria included adult patients with severe CTS, confirmed by nerve conduction studies. Patients were randomized to receive ALCAR or placebo following carpal tunnel release surgery for 2 months. The primary outcome was functional improvement using the Boston Carpal Tunnel Questionnaire (BCTQ), with secondary outcomes that focus on physiological function. To follow recovery and monitor safety, patients were seen postoperatively at 3 months, 6 months, and 1 year. Outcomes were analyzed using 2-way ANOVA. **Results:** Twenty patients were enrolled in the study, 18 completed the study. Demographics and baseline measures were similar between the 2 groups. There was no difference in the primary or secondary outcomes between groups at 12-month follow-up. Both groups improved with time over the course of the study and treatment was well tolerated. The magnitude of improvement in BCTQ with ALCAR was well below the minimal clinically important difference. **Conclusion:** ALCAR did not improve nerve regeneration or functional recovery in patients with CTS. The use of ALCAR to enhance peripheral nerve regeneration in compression neuropathy is therefore not supported. **Learning Objective:** (1) Define ALCAR role in promoting peripheral nerve regeneration in CTS.

### RP02 - Factors That Affect Medical Students? Perception and Impression of a Plastic Surgery Program

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**Purpose:** Previous studies have highlighted the importance of both residency programs and applicants finding a “good fit” however, it remains poorly understood which factors influence a medical student’s impression of a program and his or her desire to train at a certain program. The objective of this cross-sectional study was to identify which specific, potentially modifiable factors during electives and interviews were most important to Canadian medical students when ranking plastic surgery programs. **Methods:** An electronic survey with 42 questions related to factors affecting impression of a plastic surgery program. The survey was sent to all Canadian final year medical students who applied through the 2016 to 2017 Canadian Residency Match Service (CaRMS) cycle to plastic surgery at the University of Toronto. Survey responses were collected anonymously for analysis, which consisted of weighted averages of the Likert scores. **Results:** Twenty-three (50% response) responses were received. The most important general factors affecting a medical student’s

impression and desire to train at a particular residency program were mentors at a specific program (weighted average 6.39) and geographic location of a program (weighted average 5.65). During elective rotations, the most important factors identified were overall impression of resident and staff collegiality (weighted average 6.57), overall impression of resident happiness (weighted average 6.52), and having a formal debrief and rotation-end evaluation with the supervising staff (weighted average 6.04). At program interviews, perceiving an atmosphere of collegiality (weighted average 6.45) and opportunities to interact with residents and faculty at an organized social event (weighted average 5.95) were considered of greatest importance. **Conclusions:** Current applicants to plastic surgery prioritize resident happiness, program collegiality, and meaningful faculty relationships, such as those with a mentor, when ranking residency programs. Although finding a mutually “good fit” between applicant and program remains a major ideal, these findings indicate the importance of certain tangible, potentially modifiable factors that affect how medical students ultimately perceive and rank plastic surgery programs. **Learning Objective:** (1) List features of plastic surgery programs prioritized by applicants.

### RP03 - Abdominal Hernias in Massive Weight Loss Patients Undergoing Abdominoplasty or Panniculectomy

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**Purpose:** Patients experiencing massive weight loss (MWL) after bariatric surgery are at increased risk of developing incisional hernias. In this study, we aim to determine differences in patient characteristics, hernia rates, and treatment outcomes in MWL patients undergoing abdominoplasty/panniculectomy (AP/PAN), either through bariatric surgery or diet and exercise alone. **Methods:** A retrospective chart review was performed of MWL patients undergoing AP/PAN either alone or as a combination procedure. The patient database of the primary plastic surgeon treating MWL patients was used, from September 2010 to December 2016. Review of charts included patient comorbidities, surgeries performed, and hernia and complication rates. Statistical analysis was performed with Student *t* test and  $\chi^2$  test, as appropriate. **Results:** Three hundred forty MWL patients underwent body contouring procedures involving AP/PAN (121 in the diet and exercise [DE] group and 219 in the bariatric surgery [BS] group). Average age was significantly greater in the BS than the DE group. The average weight loss prior to surgery as well as the preoperative BMI was significantly greater in the BS group compared to the DE group. The hernia rate in the BS group also approached significance over the DE group (19% vs 12%,  $P = .07$ ). Hernias were safely repaired by the attending surgeon or general surgery (in 21% of cases). There were no hernia recurrences within time of follow-up. The overall complication rate in the BS group was

greater than the DE group (27% vs 17%,  $P < .05$ ), with most complications involving superficial wound dehiscence or necrosis (in 24% of patients). **Conclusion:** In this study, we show that hernias are safely repaired at the time of AP/PAN. While hernia rates do not significantly differ between the 2 groups, the rate of complications is greater in those having undergone bariatric surgery. **Learning Objectives:** The learner will be able to discuss the differences in complication and hernia rates in MWL patients who lost weight through bariatric surgery compared with diet and exercise alone.

### RP04 - Do Microsurgical Outcomes Differ Based on Which Specialty Does the Operation? An Analysis of 6,617 Cases From the National Surgical Quality Improvement Program

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**Purpose:** Since plastic surgeons don't “own” a specific anatomical region, other surgical specialties have increasingly assumed procedures historically performed by plastic surgery. Decreased case volume is postulated to be associated with higher complication rates. In this study, we investigate whether volume and surgical specialty has an impact on microsurgical complications, specifically surgical site infection (SSI) and reoperation rate. **Methods:** The 2005 to 2015 NSQIP participant use file was queried by CPT code and stratified by surgical specialty. A multivariate logistic regression model was performed to compare SSIs between surgical specialties for breast and head/neck reconstruction. To investigate the effect of case volume on complication rates, the cumulative frequency based on CPT code and surgical specialty was modeled. **Results:** NSQIP captured a total of 6617 microsurgical cases. Multivariate logistic regression revealed that although the rates of SSIs were lower in plastic surgery compared to otolaryngology for head and neck reconstructions (13.3% vs 10.5%), and compared to general surgery for breast reconstructions (5.4% vs 4.7%), they failed to reach a statistical significant difference ( $P = .96$  and  $P = .28$ ). The rate of reoperation was lower in the surgical specialty performing a greater number of cases, but again there was no significant difference between specialties. Increased case volume is negatively correlated with complications. **Conclusions:** Plastic surgery is a specialty at risk, as increasingly the same procedures are being performed by other specialties. From our systems-reported outcomes study, we conclude that surgical specialty does not affect the rate of SSIs and reoperations. We also demonstrate a correlation between lower volumes and increased complications. Once a specialty has amassed critical case experience, complication rates may decrease, and outcomes can be equivalent or superior. Case breadth and volumes

should be maintained to preserve skills and optimize outcomes. **Learning Objectives:** (1) To study microsurgical outcomes among different specialties.

### RP06 - Why do Canadians Travel Abroad for Cosmetic Surgery? A Study on Motivations for Cosmetic Tourism

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**Purpose:** Cosmetic surgery tourism is a well-known entity to most plastic surgeons practicing within Canada. Although increasing trends in Canadians travelling abroad may simply parallel increased globalization, with many of these same procedures being offered within Canada there remains a lack of understanding for Canadians' motivations to travel abroad for such procedures. The purpose of this study was to gather information on the motivations of Canadians who seek cosmetic surgery abroad. Such information could be helpful to improve care offered locally should deficits in local care be identified, or to help develop recommendations for Canadian medical tourists should such travel prove to be inevitable. **Method:** Using qualitative methodology, semi-structured interviews were conducted following a predetermined topic guide with Canadians who had cosmetic surgery abroad. Interviews were transcribed and coded using thematic analysis to determine motivational themes. Once saturation of emerging themes had been achieved patients ceased to be recruited for interviews. Results were then reviewed with a new group of participants to validate the themes. **Results:** Thematic saturation was achieved after eight interviews. All patients travelled to Mexico for their surgery. The most common procedures were breast augmentation with mastopexy followed by abdominoplasty. Reasons for choosing to travel abroad were identified as the following ten themes in the order of decreasing frequency: cost, postoperative care provided, "marketing machine," word-of-mouth, availability, family, waitlist, cleanliness, and specific concerns with local surgeons. Interestingly, all patients interviewed were guaranteed a "warranty" for possible subsequent revisions, however only 3 of the 8 were able to contact the surgeons' office postoperatively. **Conclusion:** The majority of subjects in this study engaged in cosmetic tourism due to financial reasons and the level of postoperative care provided. New themes encountered in this study that had not previously been described in the literature were issues with cleanliness in local facilities as compared to those in Mexico. All patients were offered warranty work from their surgeons preoperatively, yet less than half were able to contact the surgeons once complications were identified. **Learning Objectives:** (1) Outline reasons why Canadians engage in cosmetic tourism. (2) Obtain information on the types of surgeries undergone, cost, and preoperative information provided to patients.

### RP07 - Scoping Review of the National Surgical Quality Improvement Program in Plastic Surgery Research

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**Background:** The National Surgical Quality Improvement Program (NSQIP) is a robust, high-quality surgical outcomes database that measures risk adjusted 30-day outcomes of surgical interventions. The purpose of this systematic review is to describe how the NSQIP is being used in plastic surgery research. **Methods:** A comprehensive electronic literature search was completed in PubMed, EMBASE, MEDLINE, and CINAHL. Two reviewers independently reviewed articles to determine their relevance using predefined inclusion criteria. Articles were included if they utilized NSQIP data to conduct research in a domain of plastic surgery or analyzed surgical procedures completed by plastic surgeons. Extracted information included the domain of plastic surgery, country of origin, journal, and year of publication. **Results:** A total of 106 articles met the inclusion criteria. The most common domain of plastic surgery was breast reconstruction representing 35% of the articles. Of the 106 articles, 95% were published within the last 5 years. The journal of Plastic and Reconstructive Surgery published the most (59%) NSQIP-related articles. All the studies were retrospective. Of note, there were no articles on burns and only 1 study on trauma as this domain of plastic surgery. **Conclusion:** This systematic review describes how NSQIP data are being used to analyze plastic surgery interventions and guide quality improvement in 106 articles. It demonstrates the utility of NSQIP in the literature, however also identifies some limitations of the program as it applies to plastic surgery. **Learning Objectives:** (1) Participants will gain an understanding of how the NSQIP is being used to improve quality of healthcare. (2) Participants will be able to describe how the NSQIP is being used to conduct quality assurance research in plastic surgery. (3) Participants will be able to identify the strengths and limitations of the NSQIP as it applies to the specialty of plastic surgery.

### RP08 - Improved Outcomes of Renal Injury Following a Burn Injury

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**Purpose:** To describe incidence and outcomes of patients admitted to intensive care (ICU) with a major burn injury who develop AKI. We additionally sought to determine risk factors for developing AKI. **Methods:** We conducted a historical cohort study of patients admitted to ICU from 2010 to 2016 with major burn injury. Demographic, laboratory, and clinical

information was collected. AKI was defined by Acute Kidney Injury Network (AKIN) classification. Multivariable logistic regression was used to model association between baseline risk factors and risk of AKI. **Results:** Of the 151 patients included, 64 (42%) people developed AKI defined by stages 1 to 3 of AKIN criteria. The median TBSA was 20% (IQR 9-41). Renal replacement therapy was required in 18/64 (28%) who developed AKI. Multivariable logistic regression demonstrated association between AKI and the following variables: APACHE II score (OR 1.2, 95% CI 1.1-1.3,  $P = .001$ ), age (OR 1.8 per 10 year increase, 95% CI: 1.2-2.5,  $P = .002$ ) and log(TBSA). Fractional polynomial regression demonstrate that the best functional form of TBSA was in the natural logarithm (OR 2.7, 95% CI: 1.5-4.7,  $P = .001$ ). Compared to those without AKI, patients with AKI had longer duration of mechanical ventilation, (median 11 [IQR 6-19] vs 4 [IQR 2-9] days), ICU stay (15 [IQR 9-22] vs 6 [IQR 3-10] days), and increased mortality (14 of 64 (22%) vs 4 of 87 (5%). **Conclusions:** AKI is common in patients with a major burn injury. However, mortality is lower than described in the literature, particularly for those who required renal replacement therapy. **Learning Objectives:** To educate plastic surgeons on the risk factors and contemporary prognostic implications of AKI in burn injury.

### RP09 - Minimizing Morbidity in the Reconstruction of Abdominoperineal Resection Defects

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**Purpose:** Colorectal cancer affects over 25 000 Canadians per year. Surgical treatment for low rectal cancer is in the form of abdominoperineal resection or pelvic exenteration. This leaves a large, complex, and often radiated wound for reconstruction. The ideal closure is one with the least morbidity, fastest recovery, and lowest complication rates. Musculocutaneous flaps were once considered the main option however fasciocutaneous flaps are less morbid, quicker to perform and potentially equal or superior in overall outcome. The purpose of this study is to examine complication and dehiscence rates when a VY fasciocutaneous flap is used compared with alternate techniques. **Methods:** A retrospective chart review of all cases from 2012 to 2017 of abdominoperineal resection performed at a large Canadian hospital was conducted. Patient demographics including history of radiation, tumor characteristics, reconstruction method, complications, and length of stay were collected. Parametric and nonparametric tests were used to explore differences between closure types. **Results:** In total, 166 cases of abdominoperineal resection were completed at a single center over a 5-year period. Sixteen cases were closed using a modified bilateral VY fasciocutaneous flap technique, 116 closed primarily, 15 with VRAM, 4 with gracilis, and 15 with levator closure and packing. Of 166 cases, 16 wounds

dehiscid. There was no difference between type of closure and dehiscence rates ( $P = .07$ ). Length of stay in hospital was not significantly different between fasciocutaneous and musculocutaneous flaps ( $P > .05$ ). Tumor size did not significantly affect dehiscence rates ( $P = .85$ ). **Conclusion:** Offering patients a bilateral VY fasciocutaneous has thus far been shown equal in complication and dehiscence rates compared with musculocutaneous flap closure. The elevation of a fasciocutaneous flap is safe and significantly less morbid than a musculocutaneous flap. Fasciocutaneous flaps should be considered in the reconstructive algorithm for APR defects. **Learning Objectives:** Discuss reconstruction options for perineal (APR) defects review common complications following APR reconstruction

### RP10 - Secondary Effects of Radiation Therapy to the Hand for Benign Conditions

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**Purpose:** Emerging literature introduces radiation therapy for Dupuytren's contracture and recurrent giant cell tumor (GCT) of the tendon sheath. However, hand surgeons are wary recommending radiation therapy for nonmalignant conditions. We have used radiation therapy for recurrent GCT and to prevent recurrence after treatment of Dupuytren contracture in patients with strong diathesis. The purpose of this study is to examine the secondary effects of radiation to the hand through the critical lens of a hand surgeon. **Method:** A case series of patients who received radiation therapy for GCT were reviewed. The Radiation Oncology Toxicity Grading (ROTG) Late Radiation Morbidity Scoring Schema was used, patients were questioned about symptoms, and examined for physical findings involving their irradiated digits. **Results:** A total of 8 GCT patients presented for follow-up. The average patient age was 59.1 years, and the average time since radiation therapy was 5.4 years. Patients had an average of 2.3 surgeries on the affected digit prior to receiving radiation therapy. The average Disabilities of the Hand, Shoulder, and Arm (DASH) score was 8.1. The most common sign of radiation was nail changes. All patients complained of sensibility changes, although only 2 of the 8 patients had abnormal moving 2-point discrimination tests. There were no confirmed recurrences of GCT and no skin cancers. **Conclusions:** Patients who received radiation therapy to the hand report high levels of satisfaction with the therapy. In our small sample, the negative effects of radiation did not seem to worsen with time. Radiation therapy is tolerated well by these patients and has a low level of long-term morbidity in our population. **Learning Objective:** Participants will be able to consider the role of radiation therapy in patients with specific benign pathology of the hand, including infiltrative and recurrent GCT and patients with strong Dupuytren diathesis.

## RP11 - The Comparative Effect of Presurgical Nasoalveolar Molding in Unilateral and Bilateral Cleft Lip and Palate Patients: Anthropometrics and Learning Curve

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**Purpose:** Presurgical nasoalveolar molding (NAM) is a useful adjunct in the treatment of cleft lip and palate patients. The primary objective of this study is to evaluate the relative effectiveness of NAM therapy in unilateral versus bilateral cleft lip and palate as measured by presurgical anthropometrics. The secondary objective is to determine the presence of a learning curve in the use of NAM. **Method:** This retrospective study included all unilateral and bilateral cleft lip and palate patients who underwent NAM therapy prior to surgical repair at the Montreal Children's Hospital between 2009 and 2016. Anthropometric measurements of pre- and post-NAM nasal and dental molds were acquired using a digital caliper. **Results:** A total of 37 cleft lip and palate patients were included (26 unilateral and 11 bilateral). In unilateral cleft lip and palate, NAM was more effective in reducing cleft nostril width ( $P = .003$ ) and bialar width ( $P = .03$ ) than in bilateral cleft lip and palate. In bilateral cleft lip and palate, the final nostril height obtained was significantly higher than unilateral cleft lip and palate ( $P < .001$ ). There was no significant difference between unilateral and bilateral cleft lip and palate in the reduction of alveolar width and individual intersegmental distance. Nasal symmetry measurements did not show a correlation with years of experience with NAM, indicating no significant learning curve in the use of NAM therapy. **Conclusions:** NAM therapy has different treatment effects on unilateral and bilateral cleft lip and palate patients. Understanding these treatment differences may help clinicians better define the indications for NAM in selective patients with cleft lip and palate. **Learning Objective:** To understand the differences in the effect of NAM therapy on unilateral and bilateral cleft lip and palate patients.

## RP12 - Trends in Pediatric Hand Fractures: The CHEO Experience

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**Purpose:** This project seeks to identify areas of focus for: hand injury prevention, reduction in treatment cost, and a possible role for primary care physician (PCP) management of select nonoperative hand injuries in order to combat rising clinic volumes. **Methods:** This is a retrospective chart review, examining 500 consecutive hand injuries (April-December 2015) at CHEO. Electronic records and plain films were evaluated. **Results:** Five hundred patients were examined. Age: 0-18 (mean = 11.6 years). Male: 64.4%; female: 35.6%. Mean time

to management: 9.17 days. In children <5 years, 75% hand injury occurred by crush mechanism. In children >10 years, majority of injury was from hyperextension and axial load mechanism during sport. Seventy five % (374/500) of injuries were managed without procedural intervention. Of these injuries, 119 were nondisplaced SH2 fractures of the phalangeal base, 26 were buckle fractures, and 32 were volar plate injuries. These nonoperative injuries had a mean of 3 clinic visits and no complications. There were 61 closed reductions. Thirty-two patients required internal fracture fixation with either K-wire ( $n = 29$ ) or plating ( $n = 3$ ). Eighty-seven percent of patients were referred to physiotherapy or occupational therapy. There were 15 reported complications including: pin-site infection ( $n = 2$ ), mal-union (angulation:  $n = 7$ ; intra-articular step:  $n = 1$ ), non-union ( $n = 1$ ), CRPS ( $n = 2$ ), delayed union ( $n = 1$ ), and parrot's beak deformity ( $n = 1$ ). One patient complication (malunion with angulation) required intervention (osteotomy). **Conclusions:** This is the largest review of outpatient pediatric hand injury from a Canadian center. Findings suggest that prevention should protect against crush injuries in children <5 years, and against sport-related injury in children >10 years. The minority (6.4%) of pediatric hand injuries required operative fixation, and complication rates were low (3%). Cost saving initiatives could focus on: judicious referral to occupational and physiotherapy, and limited clinic follow-up in stable injury patterns. This review suggests a possible role for PCP follow-up of injury patterns including select nondisplaced phalangeal base SH2, volar plate, and buckle fractures. **Learning Objectives:** (1) Listeners will learn about the epidemiology of hand fractures at the Children's Hospital of Eastern Ontario (a tertiary care center). (2) The learner will gain an understanding of common mechanisms of hand injury by age-group in this pediatric population. (3) The learner will gain an understanding of the common nonoperative injury patterns within the referral base for pediatric hand injury, and some potential areas of focus for future cost-saving strategies.

## RP13 - Surgical Outcomes With the Ideal Implant

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**Purpose:** Silicone gel breast implants are typically regarded as having a more natural look and feeling than saline implants. The Ideal Implant is a saline breast implant designed as an alternative to gel implants with a more comparable palpability and less rippling for women who wish to avoid gel implants. **Methods:** A retrospective series on 75 patients who underwent breast augmentation with an ideal implant between 2016 and 2018 by the editing author was performed. Demographics, perioperative complication, and results were recorded. **Results:** Between 2016 and 2018, there were a total of 75 patients and 150 breasts operated on with the use of an ideal implant. There were no incidences of

implant failure, rippling, or implant malpositioning. There was a single case of capsular contracture. One patient elected to have her implants upsized and switched to gel upon doing so. **Conclusion:** Saline breast implants are commonly associated with an unnatural palpability and visible rippling. The ideal implant provides an alternative to traditional saline implants but with a more natural look and feel seen with silicone gel implants. **Learning Objective:** To discuss clinical outcomes with the use of the ideal implant in primary breast augmentation. **Disclosure:** Dr Gelfant is a shareholder in Ideal Implant Incorporation, the company responsible producing the ideal implant for breast augmentation surgery.

### RP14 - Video Technologies for Recording Open Surgery: A Systematic Review

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**Purpose:** Video recording of surgical procedures is an important tool for education, performance enhancement, and error analysis. Technology for video recording open surgery, however, is limited. The objective of this article is to provide an overview of the available literature regarding the various technologies used for intraoperative video recording in open surgery. **Method:** A systematic review was conducted in accordance with the Preferred Reporting Items for Systematic Review and Meta-Analyses (PRISMA) guidelines using the Medline, Cochrane Central, and Embase databases. Two authors independently screened the titles and abstracts of the retrieved articles and those that satisfied the defined inclusion criteria were selected for a full-text review. **Results:** The 2018 publications were identified, with 100 included for review. The included articles were categorized based on type of article, surgical subspecialty, type and positioning of camera, and limitations identified with their use. The most common type of article were primary—technical (n = 30) and the dominant specialties were general (n = 21) and plastic surgery (n = 20). The most commonly cited camera used was the GoPro (n = 32) positioned in a head-mount configuration (n = 70). Commonly cited limitations included: poor video quality, inadequate battery life, overexposure, obstruction by surgical team members, and excessive motion. **Conclusions:** Technological innovation is absolutely critical to fulfill the unmet need for better video capture of open surgery, which remains the mainstay of Plastic Surgery today. These data and the identified limitations will be valuable for guiding future development of novel technology in this field. **Learning Objectives:** (1) Identify camera technologies and configurations currently being used to film open surgery. (2) Understand the limitations of currently available technology for filming open surgery. (3) Identify innovation targets for better intraoperative video recording in open surgery.

### RP15 - Universal Precautions (Measures of Support) Are Needed: A Cross-Sectional Study of Health Literacy in Patients With Dupuytren

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**Purpose:** Health literacy (HL) represents the degree to which patients can understand and act upon health information. An association between limited HL and poor health status, and all-cause mortality only partially illustrates the profound impact of HL on surgical patients. Our aims were (1) to determine the prevalence of limited HL in Dupuytren's patients and (2) to identify independent predictors of limited HL. **Methods:** This cross-sectional study was performed in a tertiary care center. Patients with a clinical diagnosis of Dupuytren and self-reported fluency in English were included. The Newest Vital Sign (NVS), a rapid, validated, and reliable screening tool previously used in the hand surgery literature, was selected to measure HL. Limited HL was defined as a score of  $\leq 3$  out of 6. An exploratory multivariable logistic regression model was used to identify possible predictors. **Results:** A total of 185 patients met eligibility criteria and from those, 44% (n = 82) had limited HL. Univariate analyses showed that patients with limited HL were more likely to be older ( $P = .006$ ), have a maternal language other than English ( $P = .003$ ), and have less education ( $P = .002$ ). Multivariable regression analysis revealed that being in the lower 3 income quintiles had a nearly 5-fold increase in the odds of having limited HL. Having immigrated increased the odds of limited HL by a factor of 3.6. Age, maternal language, education, comorbidities, and employment were not independent predictors of limited HL. **Conclusions:** Our study reveals a high prevalence of limited HL (44%) among Dupuytren's patient. It is clear that universal measure of support would be of high value when communicating and caring for all Dupuytren's patients and potentially in hand surgery and beyond. **Learning Objectives:** (1) To understand health literacy and its importance in hand surgery. (2) To recognize predictors of limited health literacy in patients with Dupuytren.

### RP16 - Antibiotic Prophylaxis in Alloplastic Breast Reconstruction: Regimens and Outcomes

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**Purpose:** Surgical site infections (SSI) in prosthesis-based breast reconstruction can have a significant impact on patient outcome. Despite current CDC guidelines recommending only 24 hours of antibiotic prophylaxis postoperatively, various regimens of perioperative antimicrobial regimens are reported

in the literature. Consensus on the optimal duration of antibiotic use remains unclear. In this study, we aim to compare the incidence of surgical site infections following different antibiotic durations. **Methods:** In this retrospective case series, all consecutive patients who underwent expander/implant-based breast reconstruction between January 2009 and December 2014 at Hamilton Health Sciences were included. Data on patient demographics, risk factors, operative time, choice and timing of antibiotic used before surgery, and the duration of postoperative antibiotic use were collected. The primary outcome, SSI, is defined according to CDC criteria. **Results:** A total of 513 consecutive expander/implant-based cases were included. Minimum follow-up time was 1 year. The overall infection incidence was 14%, and rate of subsequent explantation was 8%. Of the infected cases, 65% received 1 week of postoperative antibiotic, while 15% had a prolonged course of antibiotic (2-3 weeks;  $P = .003$ ,  $OR = 2.9$ ). Most infections were superficial (65%). Prior history of radiation treatment was identified as a risk factor for developing surgical site infection ( $P = .02$ ). **Conclusion:** Overall infection rate and risk factors for infections are in keeping with current literature. We found that prescribing 1 week of postoperative antibiotic is associated with a higher incidence of SSI compared to a prolonged antibiotic regimen. However, prospective studies are needed to define the optimal antibiotic prophylaxis regimen in this patient population. **Learning Objectives:** (1) Identify risk factors for SSIs in patients undergoing prosthesis-based breast reconstruction. (2) Discuss various perioperative antimicrobial regimens used in current practice

### RP17 - Cleft Triage in Global Surgery: A Scoping Review

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**Purpose:** To characterize how international surgery missions are triaging cleft patients. **Methods:** Online databases MEDLINE, EMBASE, and PubMed were search from inception until November 1, 2017. Grey literature and reference lists were scanned and a content expert consulted for potential studies. Studies were included if they described any component of the triage process in patients with a cleft lip or palate. Studies were excluded if they were not global surgery or focused only on outcomes without comment on triage. All study designs were eligible. Screening and data extraction were performed in duplicate by 2 independent reviewers. Qualitative analysis, including thematic analysis, was performed. PRISMA guidelines were followed. **Results:** Two hundred and sixty-nine records were identified through online databases and 1 additional article through other sources. Ten articles met inclusion criteria representing 1754 patients with clefts screened. All included articles were published after 2006 and the most common study designs were cross-sectional (50%) and narrative (40%). Half of the studies were published in the United States. Themes included (1) description of recurring missions with

small groups of health care staff (70%), (2) patient barriers to reconstructive surgery (10%), and (3) education on how to set-up a successful mission (20%). Most missions were 7-10 days with 1 day designated for triage. Of the studies that recorded advertisement ( $n = 5$ ), all advertised in advance of triage day through different media (paper, radio, television, and in person). Most studies followed a similar triage pattern: non-specific recruitment before triage day, screening on triage day by all team physicians, and lab work before being cleared for surgery. Two studies had set triage criteria. No studies performed quantitative analyses on triage. **Conclusion:** Although global surgery is increasing, cleft triage represents a gap in knowledge, and there is a need for studies with quantitative analysis. **Learning Objectives:** Identify common trends in cleft mission triage.

### RP18 - The Success of Digital Replant Salvage Procedures: A Retrospective Cohort Study

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**Background:** The success of salvage procedures for failing digital replants (FR) is not well documented. We sought to evaluate the success rate of replants, success rate of nonoperative and operative salvage procedures for FR, and factors contributing to successes and failures of replants. **Methods:** Adult patients who presented to our academic center between January 1, 2000, and December 31, 2015, had  $\geq 1$  digital amputation(s), and underwent digital replantation were included. Continuous data were compared with student  $t$  tests and Mann-Whitney  $U$  tests. Categorical data were compared with  $\chi^2$  tests and Fisher exact tests. **Results:** Fifty-two patients and 83 digits were included. Fifty-two (63%) digits showed signs of compromise (arterial ischemia = 15; venous congestion = 37) and 48 digits had salvage therapy. Twenty-one (44%) FR were successfully salvaged via operative means (1 of 2; 50%), nonoperative means (19 of 43; 44%), and combined means (1 of 3; 33%). Patients with FR were more likely than those with successful replants to receive a blood transfusion (52% vs 23%;  $P = .009$ ) with more transfused units (3.45 vs 0.86;  $P = .001$ ). Length of stay was prolonged for patients with FR (9 vs 7 days;  $P = .039$ ). Ultimately, 59% (49 of 83) of replants were successful, where 37% (21 of 83) were successful secondary to salvage. **Conclusion:** There is insufficient evidence to provide definitive recommendations regarding whether salvage procedures are sufficiently successful and economically feasible. However, we are now equipped with evidence to have informative discussions with replantation candidates regarding the risks and benefits of the procedure and possible sequelae. **Learning Objectives:** Following this presentation, learners will be able to (1) identify common reasons for and factors contributing to digital replant failure, (2) discuss different options of salvage



therapy for failing replants, and (3) acknowledge the complications of salvage therapy.

### RP19 - Plastic Surgery: Does Competitive Mean Competent?

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**Purpose:** Plastic surgery remains a competitive specialty within the CaRMS application process. However little evidence exists to suggest successful applicants perform differently when compared across surgical foundations. Simulated training is a rapidly evolving area of surgical education, suited to both educational as well as evaluation roles. Previous research at our institution has demonstrated positive correlation with medical knowledge and communication. This association however has not been evaluated with respect to participant subspecialty. **Methods:** Following established protocol, first-year surgical residents were enrolled in a 1 week surgical simulation programme. Groups of 3 to 4 residents partook in simulation-based scenarios. Subsequent blinded evaluation was performed using global rating scales consisting of medical expert, communication, and handover skills. Multivariate analysis of categorical data was then undertaken in relation to the level of exposure and subspecialty. **Results:** Residents ( $n = 86$ ) were enrolled in the programme over a 3-year period. Results were analysed in relation to participant exposure, with sub-analysis by discipline. Subspecialty participation included plastic surgery ( $n = 7$ ), ENT ( $n = 7$ ), cardiac surgery ( $n = 4$ ), vascular surgery ( $n = 3$ ), general surgery ( $n = 19$ ), obstetrics and gynaecology ( $n = 17$ ), orthopaedics ( $n = 18$ ), and urology ( $n = 12$ ). Plastic surgery residents averaged highest in both medical knowledge (3.83/5) and communication skills (4.16/5); however, this failed to reach significance ( $P = .70$ ;  $P = .34$ ). Additionally, handover skills between disciplines was not statistically significant ( $P = .82$ ). **Conclusions:** While plastic surgery continues to be a competitive specialty, early clinical performance in surgical foundations appears to be comparable across subspecialties. While plastic surgery residents averaged higher in both medical knowledge and communication skills, handover skills were below the total average. Further data collection may better identify significant differences between groups. **Learning Objectives:** (1) Specialty competitiveness does not directly predict clinical performance. (2) Alternative recruitment strategies may be warranted.

### RP20 - Effect of Treatment Delay on the Risk of Postoperative Infection of Mandible Fractures

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**Introduction:** Mandible fractures are common in craniomaxillofacial trauma. Given the nonemergent nature of the injury, patients often wait several days for surgery. This study attempts to identify the relationship between time to fracture repair and risk of infection and determine whether patients may be safely discharged home while awaiting surgery. **Design and Methods:** A retrospective chart review was performed for all consecutive mandible fractures treated by a single surgeon at the University of Alberta Hospital from 2012 to 2016. Inclusion criteria were adult patients who underwent operative treatment for a traumatic mandible fracture. Ballistic injuries and out-of-province patients were excluded. Logistic regression analysis was performed. **Results:** Two hundred ten patients met selection criteria with a total of 389 fractures. One hundred ninety-seven patients were treated with ORIF and 13 with MMF alone. Twenty-three patients had a complication (11%). Nine patients had postoperative infections (4.3%). Time to surgery did not show any correlation with risk of infection ( $P = .93$ ) or overall complications ( $P = .73$ ). Fifty-two patients were admitted to hospital at time of presentation and had surgery  $7.0 \pm 3.1$  days (mean  $\pm$  SD) from time of injury. One hundred fifty-eight patients were discharged home and readmitted electively for surgery and operated on at  $6.2 \pm 4.9$  days from time of injury. No difference was seen in complications for patients admitted to hospital compared to those who went home prior to having surgery done on an elective basis ( $P = .34$ ). **Conclusions:** There is no increased risk of infection or any other complication with increasing time to surgery following mandibular fractures. With appropriate patient selection, patients with mandible fractures may be discharged home and readmitted electively for surgical management with no increased risk of complications. **Learning Objectives:** (1) Assess the relationship between time to surgical treatment and risk of infection and other complications. (2) Determine whether patients need to be admitted to hospital while awaiting surgery.

### RP21 - Defining the Scapular and Parascapular Free Flap in Children: A Systematic Review

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**Purpose:** The versatility of scapular and parascapular free tissue transfer in adults justifies its use for multiple reconstructive efforts. Despite the common concepts extrapolated from the adult literature, there has not been any report describing the particularities of the flap in the pediatric population. The aim of this abstract is to produce a systematic review of all scapular/parascapular free flaps in the literature and to determine the indications, the particularities of flap harvest and the rate of complications. **Method:** A systematic literature review of all publications on pediatric free flaps including the scapular and/or parascapular tissues in PubMed and MEDLINE/Ovid databases was conducted. Studies were appraised for surgical

indications, outcomes, complications and study design.

**Results:** From 1988 to 2017, there have been 71 reported cases of pediatric scapular/parascapular free flaps in 14 articles. Reported indications varied from traumatic defect repair (42/70, 60%), post-burn contracture (20/70, 28.6%), wound dehiscence (3/70, 4.3%), reconstruction post-neoplasm resection (2/70, 2.9%), congenital malformation (1/70, 1.4%), unstable scar (1/70, 1.4%), and stump coverage (1/70, 1.4%). A majority of flaps were grafted to the axilla (17), followed by the foot (9) and by the head and neck area (6). From cases that reported on complications, 25% presented with postoperative problems,

and only 3/36 (8%) failed at hospital discharge. **Conclusions:**

The scapular and parascapular free flap in children is a safe and versatile option for reconstruction of the head and neck, lower and upper extremities. Technique for flap harvest, indications and complication rates resemble the adult version with particular caveats that the pediatric surgeon should be aware of.

**Learning Objectives:** (1) To determine the indications of scapular and parascapular free flaps in the pediatric population, (2) to describe the particularities of flap harvest in children, and (3) to inform patients of complication rates for scapular and parascapular free flaps in pediatrics.